Chapter 4 California Environmental Quality Act (CEQA) Evaluation

4.1 Determining Significance under CEQA

The proposed project is a joint project by Caltrans and FHWA and is subject to state and federal environmental review requirements. Project documentation, therefore, has been prepared in compliance with both CEQA and NEPA. FHWA's responsibility for environmental review, consultation, and any other action required in accordance with NEPA and other applicable federal laws for this project is being, or has been, carried out by Caltrans under its assumption of responsibility pursuant to 23 U.S.C. 327. Caltrans is the lead agency under CEQA and NEPA.

One of the primary differences between NEPA and CEQA is the way significance is determined. Under NEPA, significance is used to determine whether an EIS, or a lower level of documentation, will be required. NEPA requires that an EIS be prepared when the proposed federal action (project) *as a whole* has the potential to "significantly affect the quality of the human environment." The determination of significance is based on context and intensity. Some impacts determined to be significant under CEQA may not be of sufficient magnitude to be determined significant under NEPA. Under NEPA, once a decision is made regarding the need for an EIS, it is the magnitude of the impact that is evaluated, and no judgment of its individual significance is deemed important for the text. NEPA does not require that a determination of significant impacts be stated in the environmental documents.

CEQA, on the other hand, does require Caltrans to identify each "significant effect on the environment" resulting from the project and ways to mitigate each significant effect. If the project may have a significant effect on any environmental resource, then an EIR must be prepared. Each and every significant effect on the environment must be disclosed in the EIR and mitigated if feasible. In addition, the CEQA Guidelines list many mandatory findings of significance that also require preparation of an EIR. There are no types of actions under NEPA that parallel the findings of mandatory significance of CEQA. This chapter discusses the effects of this project and CEQA significance.

4.2 Discussion of Significance of Impacts

The significance of the potential impacts of the build alternatives under CEQA was assessed based on the CEQA Environmental Checklist provided in Appendix A and the analyses of project impacts discussed in detail in Chapter 3, Affected Environment, Environmental

Consequences, and Avoidance, Minimization, and/or Mitigation Measures. The impacts of the build alternatives are summarized in the following sections, including the identification of the level of significance of the potential adverse effects under CEQA. This section discusses the impacts of the build alternatives. For a discussion of the impacts of the No Build Alternative, refer to Chapter 3.

Because the significance discussion is organized by level of impact, starting with No Impact and concluding with Significant Effects, and because the CEQA Environmental Checklist asks about a variety of subjects for each environmental topic, environmental topics may be discussed in more than one level of significance discussion. For example, the discussion on Aesthetics appears in both the No Impact discussion as it relates to effects on scenic vistas and under the Less-Than-Significant Effects discussion as it relates to new sources of light or glare. To better help the reader, the specific CEQA Environmental Checklist questions that are addressed in the discussion are referenced below each heading for each environmental topic.

Lastly, the discussion on GHG emissions and global climate change is discussed in detail later in Section 4.2.7, Climate Change. While Caltrans has included this good-faith effort in order to provide the public and decision makers with as much information as possible about the project, it is Caltrans' determination that, in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a significance determination regarding the project's direct and indirect impact with respect to climate change (see Section 4.2.7, Climate Change, and Appendix A, Section VII, Greenhouse Gas Emissions). Caltrans does remain firmly committed to implementing measures to help reduce the potential GHG effects of the project, as described in the measures outlined in Section 4.2.7, Climate Change.

4.2.1 No Impacts of the Proposed Project

Based on the CEQA Environmental Checklist in Appendix A and the detailed analyses in Chapter 3, the build alternatives are not anticipated to result in project effects related to the environmental topics discussed below; therefore, no avoidance, minimization, or mitigation measures are required for these topics.

4.2.1.1 Aesthetics Checklist Questions a) and b):

As described in Section 3.1.7, Visual/Aesthetics, the project is located within an urbanized area that is primarily built out. None of the affected roadways are designated scenic highways, and there are no scenic vistas within the project area. Therefore, all build alternatives would result in no impact on a scenic vista or to substantially damage scenic resources within a state scenic highway.

4.2.1.2 Agriculture and Forest Resources Checklist Questions a) – e):

As described in Section 3.1.3, Farmlands/Timberlands, locations with designated farmlands within the project area include lands within the NAVWPNSTA Seal Beach and an approximately 200-acre parcel located immediately north of I-405 between Fairview Road and Susan Street. The build alternatives would not result in the current or future conversion of any Prime, Unique, or Important Farmland, or result in direct or indirect zoning changes to Prime, Unique, or Important Farmland designated by the California Resources Agency in the Farmland Mapping and Monitoring Program. Additionally, there are no forest resources within the project area. The build alternatives would have no impact on agriculture or forest resources.

4.2.1.3 Biological Resources Checklist Questions e) and f):

As discussed in Section 3.3, Biological Resources, there are no known local policies or ordinances protecting biological resources within the project area or habitat conservation plans, natural community plans, or other approved local, regional, or state conservation plans applicable to the project area. The build alternatives would not conflict with and would have no impact on local, state, or regional conservation policies, ordinances, or plans protecting biological resources.

4.2.1.4 Geology and Soils Checklist Question e):

Runoff directed to the existing storm drain system would not be affected by the ability of the soils to adequately support the use of septic tanks or alternative wastewater disposal systems; therefore, would result in no impact.Hazards and Hazardous Material Checklist Questions f) and h):

The project is located within an urbanized freeway corridor that is not adjacent to wild lands and is not within the vicinity of a private airstrip.

4.2.1.5 Hydrology and Water Quality Checklist Questions g), i), and j):

As described in Section 3.2.1, Hydrology and Floodplains, the proposed project is a transportation improvement project, and it does not place housing or modify floodplains that would result in housing being in a 100-year floodplain and would not expose people or structures to a significant loss, injury, or death involving flooding. The project area is not located within an area susceptible to inundation by seiche, tsunami, or mudflow; therefore, would result in no impact.

4.2.1.6 Land Use and Planning Checklist Question c):

As described in Section 3.3, Biological Environment, there are no habitats or natural community conservation plans covering the project area; therefore, would result in no impact

4.2.1.7 Mineral Resources Checklist Questions a) and b):

The project is located in an urbanized transportation corridor. There are no known mineral resources or locally important mineral resource recovery sites designated on local, general, or specific plans, or other land use plans within the project area; therefore, would result in no impact.

4.2.1.8 Noise Checklist Questions e) and f):

The project is located within both the Los Alamitos Joint Forces Training Base and John Wayne Airport influence areas. However, the proposed project is a transportation project within an urbanized transportation corridor designed to enhance public safety and relieve congestion. The build alternatives' proposed improvements would not expose people residing or working in the area to excessive aircraft noise; therefore, would result in no impact.

4.2.1.9 Population and Housing Checklist Questions a) – c):

The proposed project is a transportation project within an urbanized transportation corridor, designed to enhance public safety and relieve congestion. As described in Section 3.1.2, Growth, the proposed project's improvements are not intended or anticipated to induce any substantial direct or indirect change in the location, distribution, amount, or rate of growth in the project area, county, or region. Additionally, as described in Section 3.1.4.2, Relocations and Real Property Acquisition, the project would not displace housing or substantial numbers of people; therefore, would result in no impact.

4.2.1.10 Recreation Checklist Questions a) and b):

The proposed project is a transportation project within an urbanized transportation corridor, designed to enhance public safety and relieve congestion. As described in Section 3.1.2, Growth, the proposed project's improvements are not intended or anticipated to induce any substantial direct or indirect change in the location, distribution, amount, or rate of growth in the project area, county, or region. The project does not include the construction of and would not increase the use of existing neighborhood or regional parks or recreational facilities; therefore, would result in no impact.

4.2.1.11 Transportation/Traffic Checklist Questions c):

The proposed project would widen I-405 in the vicinity of the airport at the Los Alamitos Joint Forces Training Base. The proposed widening would make minor changes in the elevation of I-405 and ramps in the vicinity of the airport; however, no work is proposed within 2,700 ft of any existing runway, and there would be no impact on air traffic or aviation safety. Therefore, would result in no impact.

4.2.1.12 Utilities and Service Systems Checklist Questions a), b), e), and g):

The proposed project is a transportation project within an urbanized transportation corridor, designed to enhance public safety and relieve congestion. All stormwater within the state's ROW will not require treatment by or the expansion/reconstruction of wastewater treatment facilities or require a determination from a treatment provider to verify capacity. All construction debris will be characterized and recycled or disposed of at licensed solid waste disposal facilities in accordance with federal, state, and local statutes and regulations; therefore, would result in no impact.

4.2.2 Less than Significant Impacts of the Proposed Project

Based on the CEQA Environmental Checklist in Appendix A and the analyses in Chapter 3, the build alternatives are anticipated to result in less-than-significant impacts related to the environmental topics discussed below. No mitigation measures are required for these impacts; however, where feasible, additional minimization measures have been identified to further reduce project effects, as applicable.

4.2.2.1 Aesthetics Checklist Question d):

As described in Section 3.1.7, Visual/Aesthetics, the project is located within an urbanized area that is primarily built out. The existing I-405 is currently well-lit with street lighting along the corridor, within existing interchanges and on adjacent local streets. Although some additional lighting may be required along I-405 or at interchange locations, and also on the proposed Euclid Street southbound I-405 on-ramp from Ellis Avenue, there is a potential to create a spot location with new lighting; however, all lighting would be consistent with existing lighting and Caltrans' policy. Any new lighting would be directed downward and focused using cut-off fixtures and shielding to block light trespass into areas outside of Caltrans' ROW. The addition of traffic lanes is not anticipated to create a new source of lighting or glare along I-405. Additional traffic lanes and/or new light sources associated with the build alternatives would result in less-than-significant effects on daytime or nighttime views in the area.

4.2.2.2 Air Quality Checklist Question a) – e):

The proposed project was included in a regional conformity analysis conducted by SCAG for the conforming 2012-2035 RTP/Sustainable Communities Strategy (SCS). The project's design concept and scope have not changed significantly from what was analyzed in the regional conformity analysis. In addition, a regional operational emissions analysis was completed for all alternatives. Future emissions (2020 and 2040) for all build alternatives would be less than existing emissions. Criteria pollutant emissions for all build alternatives would be less than the future no-build conditions in years 2020 and 2040 (see Tables 3.2.6-5 through 3.2.6-7).

As described in Section 3.2.6, Air Quality, site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. If not properly controlled, these activities could temporarily generate PM_{10} and $PM_{2.5}$, and small amounts of CO, SO_2, NO_X, and VOCs. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving site. Such odors would be quickly dispersed below detectable thresholds as distance from the site increases. Construction emissions would be temporary and limited to the immediate area surrounding the construction site and would not have a significant effect on sensitive receptors, as discussed in Section 3.2.6, Air Quality. Avoidance and minimization measures AQ-1 through AQ-14 would minimize construction emissions and potential effects on adjacent sensitive receptors. The build alternatives' construction emission effects on air quality would be less than significant.

Both CO and PM hot-spot analyses were completed for the build alternatives. No CO hotspots were identified at project intersections, and potential localized PM increases associated with the widening would be offset by the increase of vehicle speed in the project area and would not have a significant effect on sensitive receptors, as discussed in Section 3.2.6, Air Quality. Additionally, mobile source air toxics (MSAT) emissions were also evaluated, as shown in Tables 3.2.6-12 and 3.2.6-13. The projected build alternatives' MSAT emission would be less than the existing conditions (2009) in both 2020 and 2040 and would not have a significant effect on sensitive receptors, as discussed in Section 3.2.6, Air Quality.

As described in detail in Section 3.2.6, Air Quality, and summarized above, the construction and operation of any of the build alternatives would not contribute significantly to or violate air quality standards, have cumulatively considerable net increases in criteria pollutants, or expose sensitive receptors to substantial pollutant concentrations. The build alternatives' construction and operational emission effects on air quality would be less than significant.

4.2.2.3 Biological Resources Checklist Questions a) – d):

As described in Sections 3.3.3, Plant Species, 3.3.4, Animal Species, and 3.3.5, Threatened and Endangered Species, no CDFG or USFWS species or species listed as candidate- , sensitive- , or special-status species were observed or anticipated to occur within the build alternatives' project disturbance areas. Potential habitat occurs within limited portions of the BSA for southern tarplant (*Centromadia parryi* ssp. *australis*), which is listed by CNPS as a 1B.1 species and burrowing owl (*Athene cunicularia*), which is a California Species of Special Concern. With the exception of these two species, there is no suitable habitat or designated critical habitat for other listed species within the project area. The build alternatives' project effects on listed species or their habitat would be less than significant.

As described in Section 3.3.1, Natural Communities, the project area is within an urbanized freeway corridor that is primarily built out. Vegetation is mostly ruderal and/or associated with freeway landscaping, with some remnant native species. Riparian vegetation within the BSA is low quality and located outside of the project disturbance area on the banks of the San Gabriel River. The build alternatives would have no effect on riparian habitat or other sensitive natural communities. The build alternatives' project effects on riparian habitat or other sensitive natural communities would be less than significant.

As described in Section 3.3.2, Wetlands and Other Waters, 19 potential USACE jurisdictional areas are located within the project area. Based on the preliminary design, Alternatives 1, 2, and 3 would result in 0.99, 1.03, and 1.14 acres, respectively, of permanent operational effects through the placement of roadway fills, structures, and required drainage enhancements/reconstruction. One feature, identified as 4-4 in Table 3.3.2-1, contains wetlands as defined by USACE guidelines. The wetland is located outside of the project disturbance area and will not be affected by implementation of any of the build alternatives, nor would it be affected by indirect or temporary construction impacts. The project permitting process and associated permit conditions would require avoidance where feasible and mandate conditions to minimize effects on jurisdictional drainages. No modifications of USACE jurisdictional drainages will be allowed until a permit has been obtained. The build alternatives' project effects on federally protected wetlands would be less than significant.

As described in Section 3.3.1, Natural Communities, the BSA does not contain any known regional wildlife corridors. Any corridors that may have been historically present have since been modified as a result of private and public development. The build alternatives' project effects would be less than significant and would not interfere with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Additionally, as described in Section 3.3, Biological Environment, minimization measures BIO-1 through BIO-10 have been incorporated to further reduce the potential project effects of the build alternatives on biological resources.

4.2.2.4 Cultural Resources Checklist Question a) and d):

As described in Section 3.1.8, Cultural Resources, three built environment properties were identified as historical resources within the project area: (1) the Segerstrom House and Barn were previously determined to appear eligible for listing in the NRHP (CRHR status code 3S); (2) Leisure World was evaluated and appeared eligible for listing in the NRHP and the CRHR as an historic district (CRHR status 1 and 2, with a local level of significance); and (3) Westminster Lanes was evaluated and appeared eligible for listing in the NRHP and CRHR as an individual resource (CRHR status 1, with a local level of significance). However, on October 20, 2011, the SHPO responded as follows: (1) concurred that the Segerstrom House is eligible for the NRHP under Criterion C, however, the eligibility under Criterion A was indeterminate, and (2) the NRHP eligibility for Leisure World and Westminster Lanes was also indeterminate. These resources are located outside of the Direct APE and the proposed project effects would not cause a substantial change in the significance of historical resources, and the build alternatives' project effects on these properties would be less than significant.

If any buildings and/or structures in the project APE are determined eligible for listing in the NRHP subsequent to finalizing the Final EIR/EIS, then such buildings and/or structures shall not be destroyed or significantly altered as part of construction of this project. Proper coordination shall be undertaken with the entity responsible for such listing. Through the implementation of Minimization Measure CUL-3, the build alternatives' potential project effects would be further minimized and result in a less than significant impact.

As described in Section 3.1.8, Cultural Resources, two archaeological sites were identified within the project area: (1) CA-ORA-113 and (2) CA-ORA-162. These sites currently exhibit no manifestation on the surface; however, given the fact that there is an average of 3 to 8 ft of fill overlying the Direct APE, and up to 30 ft at overpasses and underpasses, which would have required grading prior to the deposition of fill, there is little to no potential that there remains any intact, significant portions of this site preserved below this fill. Additionally, the type of construction planned in the location does not propose to disturb intact native sediments below fill and would not significantly affect these sites during construction. With the implementation of minimization measure CUL-1, the build alternatives' project effects would be minimized further and result in a less than significant impact.

Although considered unlikely, a potential exists to encounter human remains during ground-disturbing activities; however, the type of construction planned in these locations does not propose disturbing intact native sediments below fill and would not significantly affect these sites during construction. With the implementation of Minimization Measure CUL-2, the build alternatives' potential project effects would be further minimized and result in a less than significant impact.

4.2.2.5 Geology and Soils Checklist Questions a) i, iv, and b)

As described in Section 3.2.3, Geology/Soils/Seismic/Topography, the build alternatives are not located in an Alquist-Priolo Fault Zone, and no faults considered capable of surface rupture are mapped as crossing the site or projecting toward the site. Three major faults are located within approximately less than 5 miles from the project area:

- The San Joaquin Hills Blind Thrust Fault (Maximum Magnitude 6.6, Reverse), which dips to the southwest below the southern portion of the project, with minimum depth of 1.25 miles; the surface projection of the shallowest portion of the fault is located at a closest distance of approximately 0.4-mile to the northeast;
- The Newport-Inglewood-Rose Canyon Fault Zone (Maximum Magnitude 7.5, Strike Slip), which is located at a variable distance of about 1.25 to 3 miles southwest of the alignment;
    - The Compton-Los Alamitos Blind Thrust Fault (Maximum Magnitude 6.8, Reverse), which dips to the northeast below the entire project alignment, with a minimum depth of 3 miles; the surface projection of the shallowest portion of the fault is located at a variable horizontal distance of 4 to 6 miles to the southwest of the site.

The proposed project is not located in an Alquist-Priolo Fault Zone, and no faults considered capable of surface rupture are mapped as crossing the site or projecting toward the site. There are no natural slopes in the project area, and the site is not in a mapped landslide hazard zone. The potential for seismically induced slope failures in the project area would be the limited lateral spreading of fill embankments due to ground shaking, combined with the presence of soft soils and/or loss of soil shear strength due to liquefaction. With the implementation of Minimization Measures GEO-1 through GEO-7, the build alternatives' potential project effects would be further minimized and result in a less than significant impact.

As described in Section 3.2.2, Water Quality and Stormwater Runoff, soil loss due to grading and other construction activities is anticipated to be minimal, and standard Caltrans BMPs would be followed to minimize soil loss and erosion during construction. With the implementation of Minimization Measures WQ-1 through WQ-3, the build alternatives' potential project effects would be further minimized and result in a less than significant impact.

4.2.2.6 Hazards and Hazardous Materials Checklist Questions a) – c) and e):

The proposed project is a transportation project, designed to enhance public safety and relieve congestion and would not result in a significant hazard to the public or environment associated with the transport, disposal, or use of hazardous material, nor result in conditions that increase risk related to foreseeable upset or accident conditions that would result in the release of hazardous materials into the environment. Construction of the proposed project would not require the extensive or ongoing use of acutely hazardous materials or substances. Construction activities would be short-term, and may occur over 54 months, and would involve the limited transport, storage, use, or disposal of hazardous materials. Some examples of hazardous materials handling include fueling and servicing construction equipment on-site and the transport of fuels, lubricating fluids, and solvents. These types of materials, however, are not acutely hazardous, and all storage, handling, and disposal of these materials are regulated by the California DTSC, EPA, OSHA, the Orange County Fire Department, and the Orange County Health Department. Adherence to the regulations set forth by county, state, and federal agencies would reduce the potential for hazardous materials impacts to less than significant.

The project is located within both the Los Alamitos Joint Forces Training Base and John Wayne Airport influence areas. However, the proposed project is a transportation project within an urbanized transportation corridor, designed to enhance public safety and relieve congestion. The build alternatives' proposed improvements would not result in any increase in the number of people living or working in the project, and project effects would be less than significant.

4.2.2.7 Hydrology and Water Quality Checklist Questions a) – f) and h):

As described in Section 3.2.2, Water Quality and Stormwater Runoff, project effects on water quality are primarily related to disturbed soil area (up to 432 acres), the construction/modification of drainages/structures within drainages and dewatering during construction and stormwater runoff, and increased volumes related to increases in impervious surfaces during operation (up to 104 acres). Construction and operational water quality discharges are regulated through the CWA, as implemented through EPA, USACE, SWRCB, and RWQCB. Project compliance with state and federal water quality regulations is required through the Statewide General Construction Permit, General Waste Discharge Requirement for Dewatering, and the Caltrans NPDES permit. Compliance with these requirements is required through the implementation of Minimization Measures WQ-1 through WQ-6. The project effects of the build alternative on water quality and hydrology would be less than significant.

4.2.2.8 Land Use and Planning Checklist Questions a) and b):

As shown in Section 3.1.1, Land Use, and in Table 3.1.1-1, the build alternatives are partially consistent and would improve traffic flow along the 16-mile stretch of the I-405 corridor. The build alternatives' proposed improvements, overall, do not conflict with applicable land use plans, policies, or regulations, and project effects would be less than significant.

As described in Section 3.1.4.1, Community Character and Cohesion, construction of the proposed project would create typical construction-related temporary and intermittent inconvenience for local and regional users and adjacent residents and business owners within and adjacent to the project corridor (i.e., construction delays, equipment operations, and temporary traffic lane and ramp closures) to accommodate construction activities. There would be no substantial barriers to access affecting the neighborhood or community cohesion within the project area during the construction period, although there would be some degree of inconvenience due to construction-related delays, obstruction closures, and equipment operation. The proposed build alternative improvements to I-405 would be undertaken to reduce congestion during peak hours. Subsequent to construction, the proposed project is anticipated to result in a beneficial impact to neighborhoods and community cohesion by reducing cut-through traffic within the adjacent neighborhoods. Community members living within the vicinity of the I-405 corridor and people commuting between Los Angeles County and Orange County would benefit from the reduced congestion and the improved freeway operations. The build alternatives' proposed improvements would not physically divide an established community, and project effects would be less than significant. Project impacts on land use and planning would be further minimized with implementation of Minimization Measures LU-1 and LU-2.

4.2.2.9 Noise Checklist Questions a) – c), and d):

CEQA Noise Discussion

Determining significance for noise impacts pursuant to CEQA is independent of the NEPA 23 CFR 772 analysis discussed in Chapter 3, which is centered on Noise Abatement Criteria. When determining whether a noise impact is significant under CEQA, noise analysis focuses on a comparison of the existing noise level at the time of the NOP to the difference between the future build and future no-build noise conditions. The CEQA noise analysis entails looking at the setting of the noise impact and then how large or perceptible any noise increase would be in the given area. Key considerations include the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level.

Construction Noise

During the construction phases of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Table 4-1 summarizes noise levels produced by construction equipment commonly used on roadway construction projects. As indicated, equipment involved in construction is anticipated to generate noise levels ranging from 80 to 89 dBA at a distance of 50 ft. Noise produced by construction equipment would be reduced over distance at a rate of approximately 6 dB per doubling of distance.

Temporary construction noise impacts are anticipated at areas located immediately adjacent to the proposed project alignment. The noise-level requirements specified in minimization measures NOI-2, NOI-3, and NOI-4 shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers, or transient equipment that may or may not be owned by the Contractor.

Minor deviations from this section concerning hours of work that do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Resident Engineer, the work will be expedited and sound levels resulting from this work will not cause adverse public reaction. Compliance with Caltrans' Standard Specifications is required, and the project effects of the build alternatives' related to construction noise would be less than significant.

Table 4-1: Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82

Source: Federal Transit Administration, 2006

Operational Noise

The information provided in Tables 4-2 through 4-4 compares the difference between the future build and future no-build condition noise levels to the existing condition noise levels at each receptor where there is a minimum 5 dBA increase between the existing noise level and future build noise level (see Appendix N). For these receptors, the future no build and build alternatives noise levels were compared assuming any anticipated reduction in noise associated with the

recommended noise abatement as described in Section 3.2.7, Noise. Related significance discussion for each alternative is provided below.

Alternative 1

With consideration of the abatement measures as required in NOI-1, as shown in Table 4-2, predicted noise impacts with abatement range from a 3-dBA increase (R 2.13, R 2.59 and R 3.77) to a 14-dBA decrease (R 2.94 Int) compared to the existing range of 51 to 81 dBA. Predicted increases in noise due to Alternative 1 with abatement would not be perceptible and are considered less than significant. Additionally, Alternative 1 with abatement would result in beneficial noise reductions at the following receptors: R 2.41, R 2.42, R 2.45, R 2.46, R 2.77A, R 2.80, R 2.81, R 2.82, R 2.84, R 2.93, R 2.94 Int, R 2.94A Int, R 2.95, R 2.96, R 2.97, R 2.97A, R 2.98, R 2.99, R 3.47, R 3.48, R 3.50, R 4.60A, R 4.61, R 4.62, R 6.35, R 6.35A, R 6.36, R 6.36A, and R 6.37.

Table 4-2: Noise Impact Analysis – Alternative 1

Receptor #	Existing Noise Condition [1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended[3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 2.13	57	58	62	4	S708	1	3	Less than Significant
R 2.41	63	69	71	2	S747B	7	-5	Beneficial
R 2.42	58	64	65	1	S747B	5	-4	Beneficial
R 2.45	59	61	66	5	S746	6	-1	Beneficial
R 2.46	68	70	74	4	S746	7	-3	Beneficial
R 2.59	61	61	67	6	S766	3	3	Less than Significant
R 2.77A	74	75	76	1	S776	7	-6	Beneficial
R 2.80	64	65	65	0	S786/S790	1	-1	Beneficial
R 2.81	68	69	69	0	S786/S790	5	-5	Beneficial
R 2.82	67	68	69	1	S786/S790	3	-2	Beneficial
R 2.83	66	66	67	1	S786/S790	1	0	Less Than Significant
R 2.84	66	66	67	1	S786/S790	2	-1	Beneficial
R 2.85	66	66	67	1	S786/S790	1	0	Less Than Significant
R 2.93	81	81	82	1	S795	12	-11	Beneficial
R 2.94 Int	51	51	52	1	S795	15	-14	Beneficial
R 2.94A Int	51	51	52	1	S795	6	-5	Beneficial
R 2.94B Int	51	51	52	1	S795	0	1	Less Than Significant
R 2.95	81	81	82	1	S795	14	-13	Beneficial
R 2.96	60	60	61	1	S795	2	-1	Beneficial
R 2.97	79	79	80	1	S795	9	-8	Beneficial
R 2.97A	79	79	80	1	S795	11	-10	Beneficial
R 2.98	79	79	80	1	S795	11	-10	Beneficial
R 2.99	79	79	80	1	S795	10	-9	Beneficial
R 3.42	62	63	68	5	-	4	1	Less than Significant
R 3.47	62	63	67	4	S841	7	-3	Beneficial
R 3.48	69	70	76	6	S841	12	-6	Beneficial
R 3.50	70	71	75	4	S841	8	-4	Beneficial
R 3.77	62	64	67	3	S896	0	3	Less than Significant
R 4.59	61	64	66	2	S1079	1	1	Less than Significant
R 4.60	64	67	73	6	S1079	5	1	Less than Significant

R 4.60A	62	65	67	2	S1083	3	-1	Beneficial
R 4.61	65	68	72	4	S1083	7	-3	Beneficial
R 4.62	62	65	69	4	S1083	6	-2	Beneficial
R 4.62A	59	62	64	2	-	2	0	Less than Significant
R 4.62B	58	61	63	2	-	1	1	Less than Significant
R 4.63	57	60	62	2	-	1	1	Less than Significant
R 6.35	64	68	70	2	S1226	4	-2	Beneficial
R 6.35A	64	68	70	2	S1226	5	-3	Beneficial
R 6.36	65	69	70	1	S1226	5	-4	Beneficial
R 6.36A	66	70	71	1	S1226	5	-4	Beneficial
R 6.37	63	67	68	1	-	2	-1	Beneficial

[1] Existing noise conditions as measured and modeled for the project Noise Study Report.

[2] Future conditions are the predicted noise conditions for horizon year (2040).

[3] Recommended soundwall locations and heights are discussed in Section 3.2.7 and the NADR.

[4] Assumes any proposed abatement in the future build condition.

Note: All measurements are in dBA.

Source: Parsons 2011k and 2011l.

Table 4-3: Noise Impact Analysis – Alternative 2

Receptor #	Existing Noise Condition[1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended[3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 2.13	57	58	63	5	S708	1	4	Less than Significant
R 2.40	67	69	72	3	-	0	3	Less than Significant
R 2.41	63	69	72	3	S745B	6	-3	Beneficial
R 2.42	58	64	66	2	S745B	5	-3	Beneficial
R 2.45	59	61	65	4	S746	5	-1	Beneficial
R 2.46	68	70	75	5	S746	7	-2	Beneficial
R 2.59	61	61	67	6	S766	3	3	Less than Significant
R 2.63	62	61	67	6	S765	3	3	Less than Significant
R 2.64	64	63	69	6	S765	4	2	Less than Significant
R 2.77A	74	75	77	2	S776	7	-5	Beneficial

Table 4-3: Noise Impact Analysis – Alternative 2

Receptor #	Existing Noise Condition[1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended[3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 2.80	64	65	66	1	S786/S790	1	0	Less Than Significant
R 2.81	68	69	70	1	S786/S790	5	-4	Beneficial
R 2.82	67	68	69	1	S786/S790	2	-1	Beneficial
R 2.83	66	66	68	2	S786/S790	2	0	Less Than Significant
R 2.84	66	66	67	1	S786/S790	1	0	Less Than Significant
R 2.85	66	66	67	1	S786/S790	1	0	Less Than Significant
R 2.93	81	81	83	2	S795	12	-10	Beneficial
R 2.94 Int	51	51	53	2	S795	15	-13	Beneficial
R 2.94A Int	51	51	53	2	S795	7	-5	Beneficial
R 2.94B Int	51	51	53	2	S795	0	2	Less Than Significant
R 2.95	81	81	82	1	S795	13	-12	Beneficial
R 2.96	60	60	61	1	S795	1	0	Less Than Significant
R 2.97	79	79	81	2	S795	10	-8	Beneficial
R 2.97A	79	79	81	2	S795	11	-9	Beneficial
R 2.98	79	79	81	2	S795	11	-9	Beneficial
R 2.99	79	79	81	2	S795	6	-4	Beneficial
R 3.42	62	63	68	5	S827	4	1	Less than Significant
R 3.47	62	63	68	5	S841	7	-2	Beneficial
R 3.48	69	70	76	6	S841	11	-5	Beneficial
R 3.50	70	71	76	5	S841	10	-5	Beneficial
R 3.77	62	64	68	4	S896	0	4	Less than Significant
R 4.33	73	76	78	2	S1006	12	-10	Beneficial
R 4.33A	50	53	55	2	S1006	12	-10	Beneficial
R 4.59	61	64	67	3	S1083	1	2	Less than Significant

Table 4-3: Noise Impact Analysis – Alternative 2

Receptor #	Existing Noise Condition[1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended[3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 4.60	64	67	74	7	S1083	6	1	Less than Significant
R 4.60A	62	65	67	2	S1083	3	-1	Beneficial
R 4.61	65	68	72	4	S1083	6	-2	Beneficial
R 4.62	62	65	70	5	S1083	8	-3	Beneficial
R 4.62A	59	62	65	3	-	3	0	Less than Significant
R 4.62B	58	61	64	3	-	2	1	Less than Significant
R 4.63	57	60	62	2	-	1	1	Less than Significant
R 4.65	69	69	74	5	S1022	5	0	Less than Significant
R 6.35	64	68	70	2	S1226	4	-2	Beneficial
R 6.35A	64	68	70	2	S1226	5	-3	Beneficial
R 6.36	65	69	70	1	S1226	4	-3	Beneficial
R 6.36A	66	70	71	1	S1226	5	-4	Beneficial
R 6.37	63	67	68	1	-	2	-1	Beneficial

[1] Existing noise conditions as measured and modeled for the project Noise Study Report.

[2] Future conditions are the predicted noise conditions for horizon year (2040).

[3] Recommended soundwall locations and heights are discussed in Section 3.2.7 and the NADR.

[4] Assumes any proposed abatement in the future build condition.

Note: All measurements are in dBA.

Source: Parsons 2011k and 2011l.

Table 4-4: Noise Impact Analysis – Alternative 3 (Preferred Alternative)

Receptor #	Existing Noise Condition [1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended [3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 1.76	59	64	65	1	-	0	1	Less than Significant
R 2.13	57	58	62	4	S708	1	3	Less than Significant
R 2.41	63	69	71	2	S745B	6	-4	Beneficial
R 2.42	58	64	65	1	S745B	4	-3	Beneficial
R 2.45	59	61	66	5	S746	5	0	Less than Significant
R 2.46	68	70	75	5	S746	7	-2	Beneficial
R 2.59	61	61	67	6	S766	3	3	Less than Significant
R 2.63	62	61	67	6	S765	3	3	Less than Significant
R 2.64	64	63	69	6	S765	4	2	Less than Significant
R 2.77A	74	75	77	2	S776	6	-4	Beneficial
R 2.80	64	65	66	1	S786/S790	1	0	Less than Significant
R 2.81	68	69	70	1	S786/S790	5	-4	Beneficial
R 2.82	67	68	69	1	S786/S790	2	-1	Beneficial
R 2.83	66	66	68	2	S786/S790	1	1	Less than Significant
R 2.84	66	66	67	1	S786/S790	1	0	Less than Significant
R 2.85	66	66	67	1	S786/S790	1	0	Less than Significant
R 2.93	81	81	83	2	S795	14	-12	Beneficial
R 2.94 (int)	51	51	53	2	S795	18	-16	Beneficial
R 2.94A (int)	51	51	54	3	S795	10	-7	Beneficial
R 2.94B (int)	51	51	53	2	S795	0	2	Less than Significant
R 2.95	81	81	83	2	S795	17	-15	Beneficial
R 2.96	60	60	61	1	S795	1	0	Less than Significant
R 2.97	79	79	81	2	S795	14	-12	Beneficial
R 2.97A	79	79	81	2	S795	14	-12	Beneficial
R 2.98	79	79	81	2	S795	14	-12	Beneficial
R 2.99	79	79	82	3	S795	15	-12	Beneficial
R 3.42	62	63	68	5	S827	4	1	Less than Significant
R 3.47	62	63	68	5	S841	7	-2	Beneficial

Table 4-4: Noise Impact Analysis – Alternative 3 (Preferred Alternative)

Receptor #	Existing Noise Condition [1]	Future[2] No Build Noise Conditions	Future[2] Build Noise Conditions	Future Build – Future No-Build	Recommended [3] Soundwall (#)	Reduction (Abatement)	Project Increase/ Decrease[4]	Impact
R 3.48	69	70	76	6	S841	11	-5	Beneficial
R 3.50	70	71	76	5	S841	10	-5	Beneficial
R 3.77	62	64	68	4	S896	0	4	Less than Significant
R 4.33A	50	53	55	2	S1006	13	-11	Beneficial
R 4.33	73	76	78	2	S1006	12	-10	Beneficial
R 4.59	61	64	67	3	S1083	2	1	Less than Significant
R 4.60	64	67	74	7	S1083	5	2	Less than Significant
R 4.60A	62	65	67	2	S1083	2	0	Less than Significant
R 4.61	65	68	72	4	S1083	5	-1	Beneficial
R 4.62	62	65	70	5	S1083	8	-3	Beneficial
R 4.62A	59	62	65	3	-	2	1	Less than Significant
R 4.62B	58	61	64	3	-	2	1	Less than Significant
R 4.63	57	60	62	2	-	1	1	Less than Significant
R 4.65	69	69	74	5	S1016/S1020/ S1022/S1024	6	-1	Beneficial
R5.39	65	66	67	1	S1162	6	-5	Beneficial
R5.40	66	67	68	1	S1162	5	-4	Beneficial
R 6.35	64	68	70	2	S1226	4	-2	Beneficial
R 6.35A	64	68	70	2	S1226	5	-3	Beneficial
R 6.36	65	69	70	1	S1226	4	-3	Beneficial
R 6.36A	66	70	71	1	S1226	5	-4	Beneficial
R 6.37	63	67	68	1	-	2	-1	Beneficial

[1] Existing noise conditions as measured and modeled for the project Noise Study Report.

[2] Future conditions are the predicted noise conditions for horizon year (2040).

[3] Recommended soundwall locations and heights are discussed in Section 3.2.7 and the NADR.

[4] Assumes any proposed abatement in the future build condition.

[int] Interior

Note: All measurements are in dBA.

Alternative 2

With consideration of the abatement measures as required in NOI-1, as shown in Table 4-3, predicted noise impacts with abatement range from a 4-dBA increase (R 2.13 and R 3.77) to a 13-dBA decrease (R2.94 Int) compared to the existing condition range of 51 to 81 dBA. Predicted increases in noise due to Alternative 2 with abatement would not be perceptible and are considered less than significant. Additionally, Alternative 2 with abatement would result in beneficial noise reductions at the following receptors: R 2.41, R 2.42, R 2.45, R 2.46, R 2.77A, R 2.81, R 2.82, R 2.93, R 2.94 Int, R 2.94A Int, R 2.94A Int, R 2.95, R 2.97, R 2.94A, R 2.98, R 2.99, R 3.47, R 3.48, R 3.50, R 4.33, R 4.33A, R 4.60A, R 4.61, R 4.62, R 6.35, R 6.35A, R 6.36, R 6.36A, and R 6.37.

Alternative 3 (Preferred Alternative)

With consideration of the abatement measures as required in NOI-1, as shown in Table 4-4, predicted noise impacts with abatement range from a 4-dBA increase (R 3.77) to an 15-dBA decrease (R 2.95) compared to the existing condition range of 57 to 70 dBA. Predicted increases in noise due to Alternative 3 with abatement would not be perceptible and are considered less than significant. Additionally, Alternative 3 with abatement would result in beneficial noise reductions at the following receptors: R 2.41, R 2.42, R 2.46, R 2.77A, R 2.81, R 2.82, R 2.93, R 2.94 Int, R 2.94A Int, R 2.95, R 2.97, R 2.97A, R 2.98, R 2.99, R 3.47, R 3.48, R 3.50, R 4.33A, R 4.33, R 4.61, R 4.62, R 4.65, R 6.35, R 6.35A, R 6.36, R 6.36A, and R 6.37.

4.2.2.10 Public Services Checklist Question a) Schools, Parks, Other Public Facilities:

As described in Section 3.1.1.4, Parks and Recreation Facilities, all schools, parks, and other public facilities are summarized in Table 3.1.1-2, and their locations are shown in Figure 3.1.1-4,. The project would have no effect on schools or other public facilities. Construction of the proposed build alternatives could require temporary construction and/or aerial easements and/or partial acquisitions from the following:

- Buckingham Park
- Cascade Park
- Pleasant View Park
- Santa Ana River Trail

Project effects on the recreational use of the properties would be limited to construction-related noise, dust, and visual effects, and use could continue during construction. Although partial acquisitions at the boundaries adjacent to the project may be necessary, acquisitions would be minor and would not affect the overall recreational value or use. Project effects on the Santa Ana

River Trail would require the temporary closure of one side of the trail; a detour would be provided along the other side to maintain continuity and use. Project effects on these resources would be minimal and would not be considered physical adverse effects requiring replacement or modification. The build alternatives' proposed improvements would be less than significant on schools, parks, and other public facilities. Project effects on parks and recreational facilities would be further minimized with implementation of Minimization Measures COM-13 and LU-3 through LU-6.

4.2.2.11 Transportation/Traffic Checklist Questions d) – f):

The proposed project would not substantially increase hazards due to design features or incompatible uses. Overall, the project would reduce hazards due to design features by including a number of design improvements over the existing condition. The proposed project would eliminate or improve the following existing nonstandard features:

- 2- to 3-ft-wide left shoulders along portions of I-405 would be widened to 10 ft in most locations.
- 2- to 3-ft clearance to median barrier along portions of I-405 would be increased to 10 ft in most locations.
- 6- to 8-ft-wide median width along portions of I-405 would be widened to 22 ft in most locations.
- 11-ft-wide travel lanes along portions of I-405 would be widened to 12 ft, except under Alternative 2 between Seal Beach Boulevard and SR-22 East the southbound lanes would be 11 ft wide.
- The lower design speed at the various loop off-ramp termini of Warner Avenue northbound and southbound loop off-ramps, Bolsa Avenue northbound loop off-ramp, and Westminster Avenue southbound loop off-ramp would be eliminated due to the removal of the "free" right-turn condition.
    - The nonstandard, "free" right turn within 400 ft of a left-turn movement at the Bolsa Avenue northbound and southbound loop off-ramp terminals would be eliminated due to the removal of the "free" right-turn condition.

As shown in Table 3.1.6-13, the project would increase the number of locations with adequate vehicle queue storage compared to the no-build condition, thereby reducing the hazards associated with queued vehicles extending beyond the areas provided for queued vehicles. As described in Section 3.1.6.3, Traffic (Environmental Consequences), the proposed project would reconfigure the I-405 interchanges at Brookhurst Street/Talbert Avenue, Magnolia Street/Warner Avenue, and Beach Boulevard/ Edinger Avenue to remove weaving sections associated with

existing cloverleaf designs and replace them with configurations that do not have weaving sections.

The proposed project would not result in inadequate emergency access. The proposed project would generally improve emergency access. The project would maintain existing arterials crossing I-405 with some widening and other improvements to those crossings that would provide improved emergency access across I-405. The project would increase emergency access to incidents along I-405 itself by providing a 10-ft-wide left shoulder along I-405, in both directions, compared to the existing condition, in which left-side shoulders wider than 3 ft are provided only at CHP enforcement areas.

The proposed project would not conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. The project would eliminate or relocate one OCTA bus stop along Ellis Avenue in the vicinity of the I-405 southbound ramp intersection with Ellis Avenue. As described in Section 3.1.6.3, Traffic (Environmental Consequences), the project would maintain existing bikeways in the corridor and provide pavement to accommodate five planned Class 2 bikeways along arterials within the project limits. As described in Section 3.1.6.3, Traffic (Environmental Consequences), the project would provide pedestrian sidewalks and crosswalks along both sides of all arterials within the proposed project limits, except on the west side of Harbor Boulevard and the south side of Edinger Avenue, for the reasons stated in Section 3.1.6.3, Traffic (Environmental Consequences). Under all of the build alternatives, the existing pedestrian crossing of I-405 at Heil Avenue would be replaced by the proposed project with a longer pedestrian bridge meeting current ADA standards. The current pedestrian crossing would remain open for use until the new bridge is constructed.

For all reasons above, all build alternatives would result in a less than significant impact.

4.2.2.12 Utilities and Service Systems Checklist Questions c), d), and f):

As described in Section 3.1.5, Utilities/Emergency Services, there are approximately 313 utilities within the project area, including overhead and underground electrical, natural gas, oil and petroleum pipelines, telephone and communication, cable television, water, and sewer. The locations of all utilities within the project area are provided in Appendix K, Section K1 Utility Plans. Most of the utilities run perpendicular to I-405 or along local streets, while approximately 18 facilities run parallel to I-405. One-hundred ninety-eight (198) of the 313 utility lines within the study area would be avoided during construction; however, each build alternative would require the replacement and/or relocation of some water, sewer, gas, electrical, and telecommunications lines within the project ROW limits, as summarized in Table 3.1.5-2.

Appendix K highlights the locations of the utility lines impacted by the proposed project; however, utility relocations are common practice with large projects, and no long-term disruptions in service as a result of the relocation or replacement of utilities are anticipated. Relocation of all 50-kV lines or greater, shall be in accordance with CPUC General Order 131-D. Relocation of these high-voltage transmission lines requires a long lead time.; however, coordination with utility companies has been ongoing and, with the implementation of UT-1 minimization measure, these impacts would be less than significant. Additionally, those utilities located within the proposed ROW and parallel to the corridor will require approval from Caltrans for an exception to the utility longitudinal encroachment policy. The build alternatives' proposed improvements would be less than significant on utilities and service systems.

Additionally, the build alternatives include modifications (extensions and widening) to existing stormwater drainage facilities within the state and local street ROWs to accommodate the widened freeway. The build alternatives would also increase impervious surfaces by up to 104 acres and disturb up to 432 acres during construction. As described in Section 3.2.2, Water Quality and Stormwater Runoff, stormwater management features in the state ROWs and construction site BMPs are proposed to accommodate and treat construction and operational stormwater to the maximum extent practicable, utilizing the best available and best conventional technologies. All storm drain systems for the build alternatives have been accounted for in the project design, and improvements were included in the design where necessary. Therefore, impacts to stormwater facilities would be less than significant.

The proposed project would utilize the municipal supply for water required for construction and irrigation, and would not require new or expanded entitlements. Project effects on municipal water supply would be less than significant. As described in Section 3.1.5, Utilities/Emergency Services, the closest landfill is permitted through 2035, and there are no known capacity-related issues. All construction debris will be recycled and/or appropriately disposed of at licensed solid waste facilities, in accordance with federal, state, and local regulations and policies. The build alternatives' proposed improvements effects would be less than significant on water supply and landfill capacity.

4.2.3 Less than Significant with Mitigation for Impacts of the Proposed Project

The following environmental resources are determined to be significantly affected by the implementation of the proposed project's build alternatives; however, these effects would be considered less than significant with the proposed mitigation and/or minimization measures outlined in Chapter 3 and as discussed below.

4.2.3.1 Cultural Resources Checklist Questions b) and c):

As discussed in Section 3.1.8 Cultural Resources, the Navy conditioned the transfer of the proposed easement in the northern NAVWPNSTA with construction of various Cost to Cure Items within their boundaries. These activities included relocation of the perimeter/security fencing and farm roads, installation of perimeter security lighting and various utilities associated with the lighting and agricultural farmland. Construction of these activities occurred in 2011 during the course of the SR-22 WCC project in the same area. The Navy required that construction activities within the NAVWPNSTA be monitored by a qualified Native American and Archaeologist. Monitoring was conducted during the Cost to Cure project within the NAVWPNSTA and one isolate, an historic bottle, was identified. Incorporated by reference from the SR-22 WCC Project, is the Navy's Native Ameican and Archaeological monitoring requirement for work on the NAVWPNSTA (CUL-4). With the implementation of CUL-4, the build alternatives' project impacts on previously unknown archaeological resources within the NAVWPNSTA would be less than significant.

4.2.3.2 Geology and Soils Checklist Questions a)ii, iii, c) and d)

The project is located in a State of California mapped Liquefaction Hazard Zone. The project area has relatively shallow groundwater, layers of loose to medium dense saturated granular soils, and moderate to high earthquake accelerations. Liquefiable soils are expansive and are considered unstable or could become unstable due to liquefaction. The design and construction of the build alternatives to current highway and structure design standards, including applicable seismic standards, would minimize the potential impacts of seismic events on the project facilities. These potential impacts are addressed in Mitigation Measures GEO-1 through GEO-7, which require specific surveys and the treatment of these conditions as part of the final design. With the implementation of Mitigation Measures GEO-1 through GEO-7, the build alternatives' potential project impacts on geology and soils would be less than significant.

4.2.3.3 Hazards and Hazardous Materials Checklist Questions d) and g):

As described in Section 3.2.5, Hazardous Waste/Materials, properties that could be acquired and are considered RECs are shown in Table 3.2.5-1 and 3.2.5-2. Also described in Section 3.2.5 are other site concerns related to LUSTs, historical spills along I-405, LBP, ADL, ACMs, and abandoned drums and soil within or adjacent to the project area. Property acquisition or disturbance without further investigation or characterization could result in a significant hazard to the public. However, the procedures for hazardous materials investigation for the project are addressed in Measures HAZ-1 through HAZ-4. With the implementation of Measures HAZ-1 through HAZ-4, the build alternatives' potential project impacts on properties potentially containing hazardous materials would be less than significant.

As described in Section 3.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities, the construction of the project would occur over 48 to 54 months. Proposed mainline improvements would necessitate the construction of up to 8 new structures, 18 structure replacements, and 6 structure widenings/modifications, which would result in construction-related delays along I-405, I-605, SR-22, SR-73, and interchanges, as well as on the surrounding local arterials, and could result in significant effects on emergency response (see Section 4.2.3.6, below). Project-construction-related closures would be addressed through a comprehensive TMP, as required by Mitigation Measure T-1, which includes requirements for coordination with and notification to the corridor cities and emergency responders. Additionally Mitigation Measures T-2 through T-9 and T-12 would improve circulation on the affected local arterials. With the implementation of Mitigation Measure T-1 through T-9 and T-12, the build alternatives' potential project impacts on adopted emergency response or evacuation plans would be less than significant.

4.2.3.4 Public Services Checklist Question a) Fire and Police Protection:

Emergency service providers and medical facilities within the project area are described in Section 3.1.5, Utilities/Emergency Services. Proposed mainline improvements would necessitate the construction of up to 8 new structures, 18 structure replacements, and 6 structure widening/modifications, which would result in construction-related delays along I-405 and SR-73, and at interchanges, as well as on the surrounding local arterials, and could result in significant effects on emergency response. However, as described in Section 3.1.4, Community Impacts, none of the temporary long-term closures that have been identified would result in any substantial effect on emergency access or response times. As described in 3.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities, a Final TMP (Mitigation Measure T-1) will be prepared in coordination with local jurisdictions and emergency service providers (e.g., CHP, local police, fire, paramedics) to identify emergency service routes that serve hospitals, fire/police stations, emergency shelters, emergency command centers, and other facilities that provide essential services in times of emergency within the study area. All emergency service routes would be maintained during construction, or alternate routes would be provided. Mitigation Measure UT-2 requires emergency service providers to be alerted in advance of any temporary road closures and delays so that they have adequate time to make appropriate accommodations to ensure prompt emergency response times that fulfill their responsibilities and defined service objectives. In addition to T-1 and UT-2, Mitigation Measures COM-1 through COM-11 would further minimize potential project effects on acceptable service ratios, response times, or other performance objectives of public services. With the implementation of Mitigation Measures T-1, UT-2, and COM-1 through COM-11, the build alternatives' potential project impacts on police and fire emergency response would be less than significant.

4.2.3.5 Transportation/Traffic Checklist Questions a) – b):

This section identifies the potential significant impacts of the proposed build alternatives (Alternatives 1, 2, and 3) to the performance of the roadways within the project limits, based on the information provided in Section 3.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities. Each build alternative is covered separately below. For each build alternative, there is the following:

- A comparison to the existing condition, including an identification of potentially significant cumulative impacts
- A reference to the comparison of the build alternative to the No Build Alternative (as presented in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities [Environmental Consequences]), identifying the build alternative's contribution to the cumulative impacts, along with mitigations for contributions that are determined to be project contributions to significant cumulative impacts
    - An identification of the difference between the build alternative and the No Build Alternative, related back to the existing condition

The existing condition is the "CEQA Baseline" condition. This section is divided into two subsections covering the portions of the study area within Orange County and Los Angeles County, respectively.

Orange County

Alternative 1

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 1 in 2020 and 2040 to the existing condition reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences). Impacts identified through the comparison are cumulative impacts resulting from the combination of the proposed I-405 project and other land development and roadway improvement projects in the corridor and region. The inclusion of other land development and roadway improvement projects in the traffic forecasts is summarized in Section 3.6.5.7, Traffic and Transportation/Pedestrian and Bicycle Facilities (Resources not Subject to Cumulative Analysis), and more fully explained in the Traffic Study in Section 2.2.2.

1. Under Alternative 1, on I-405, between SR-73 and I-605, in 2020, ADT is anticipated to have increased by 46,200 to 77,400, compared to the existing condition. In 2040, ADT is anticipated to have increased by 77,000 to 129,000 (see Table 3.1.6-2).

2. Under Alternative 1, on I-405, between SR-73 and I-605 in 2020, daily VMT is anticipated to have increased by 804,000, compared to the existing condition and by 1,343,000 in 2040 (see Table 3.1.6-3).
3. Under Alternative 1, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS F conditions are anticipated during peak hours in the GP lanes. Under the existing condition, LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. Under Alternative 1, in 2020, v/c ratios range from 0.03 lower than under existing conditions to 0.28 greater. In 2040, v/c ratios range from 0.13 to 0.48 greater than under existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. Under Alternative 1, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS F conditions are anticipated during peak hours in the HOV lanes. Under the existing condition, LOS conditions range from B to F during peak hours in the HOV lanes. Under Alternative 1, in 2020, v/c ratios range from 0.02 to 0.59 greater than under existing conditions. In 2040, v/c ratios range from 0.17 to 0.82 greater than under existing conditions (see Tables 3.1.6-5 and 3.1.6-18).
5. Under Alternative 1, on I-405 between SR-73 and I-605, in 2040, speeds in the GP lanes during peak hours range from 9 to 25 mph. Under the existing conditions, speeds range from 22 to 54 mph. HOV speeds under Alternative 1 range from 10 to 27 mph in 2040 and 43 to 62 mph under existing conditions (see Table 3.1.6-6).
6. Under Alternative 1, on I-405, from SR-73 to I-605, in 2040, corridor travel time in the GP lanes during peak hours ranges from 33 to 89 minutes, and from 15 to 37 minutes under existing conditions. HOV corridor travel time under Alternative 1 ranges from 30 to 85 minutes in 2040 and 13 to 19 minutes under existing conditions (see Table 3.1.6-7).
7. Under Alternative 1, on I-405 between SR-73 and I-605, in 2020, daily and annual vehicle hours of delay (VHD) are anticipated to be approximately 27,000 and 6 million, respectively. Under Alternative 1, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 147,000 and 32 million, respectively. Under existing conditions, daily and annual VHD are approximately 19,000 and 4 million, respectively (see Table 3.1.6-8).
8. Under Alternative 1, on I-405, between SR-73 and I-605, in 2020, branch connectors are anticipated to operate with v/c ratios ranging from 0.63 to 1.17 in 2020 and from 0.68 to 1.39 in 2040, compared to the existing range of 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 1 with all proposed mitigations, in 2020, there are five intersections anticipated to operate at LOS E or F, and four to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over

1.00 under existing conditions. In 2040, there are 11 intersections anticipated to operate at LOS E or F and 9 to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-5).

10. Under Alternative 1, in 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 100 percent, compared to 91 percent under existing conditions (see Table 3.1.6-11).
11. Under Alternative 1, in 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 86 percent, compared to 89 percent under existing conditions (see Table 3.1.6-11).
12. Under Alternative 1, in 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 80 percent, compared to 67 percent under existing conditions (see Table 3.1.6-11).

Table 4-6 shows that, under Alternative 1, in 2020, there are 11 intersections with a significant cumulative impact. The intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-6 also shows that, under Alternative 1, in 2040, there are 14 intersections with a significant cumulative impact.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP and HOV lane v/c ratios cited above in Items 3 and 4, there is a cumulative impact on the freeway mainline.

Future Build Alternative Compared to Future No Build. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 1 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 1 to cumulative impacts. As shown in Tables 3.1.6-4 and 3.1.6-17, all v/c ratios for the freeway mainline under Alternative 1 are lower than under the No Build Alternative. Therefore, the contribution of Alternative 1 to the cumulative impact on the freeway mainline is less than significant.

Table 4-6 shows (with a "Y" in the column labeled "Project Contribution Significant Impact") that, without mitigation, there are eight intersections with project contributions to cumulative impacts that are significant. Mitigation Measures T-2 through T-9 and T-12, presented in Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those significant impacts. Table 4-5 shows that, with all improvements, including the mitigations, five intersections are anticipated to have significant cumulative impacts in 2020 but in no case is the contribution of Alternative 1 to the

cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact"). Table 4-6 shows that, with all improvements, including the mitigations, 10 intersections are anticipated to have significant cumulative impacts in 2040 but in no case is the contribution of Alternative 1 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

This page intentionally left blank

Table 4-5: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
Bristol Street	I-405 NB Off-Ramp/ South Coast Drive	Bristol Street	Sig	0.45	16.4	B	0.73	30.4	C	0.59	19.7	B	0.86	37.1	D	0.59	18.8	B	0.90	38.7	D	N	N	0.70	24.4	C	0.96	44.2	D	0.71	21.9	C	0.98	46.0	D	N	N
	I-405 NB On-Ramp (from NB Bristol Street)	Bristol Street	None	0.08	--	--	0.21	--	--	0.10	--	--	0.22	--	--	0.10	--	--	0.22	--	--	--	--	0.10	--	--	0.23	--	--	0.10	--	--	0.23	--	--	--	--
	I-405 NB On-Ramp (from SB Bristol Street)	Bristol Street	None	0.20	--	--	0.15	--	--	0.23	--	--	0.16	--	--	0.23	--	--	0.16	--	--	--	--	0.25	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	--
	I-405 SB Ramps	Bristol Street	Sig	0.61	15.8	B	0.80	14.8	B	0.63	16.6	B	0.95	19.2	B	0.63	15.5	B	0.96	19.3	B	N	N	0.68	16.3	B	**1.03**	**27.6**	**F***	0.67	17.2	B	**1.05**	**32.0**	**F***	Y	N
Fairview Road and South Coast Drive	I-405 NB Ramps	Fairview Road	Sig	0.93	28.4	C	0.93	24.1	C	**1.06**	**44.0**	**F***	**1.02**	**35.1**	**F***	**1.07**	**44.5**	**F***	**1.02**	**32.9**	**F***	Y	N	**1.14**	**55.5**	**F***	**1.06**	**41.8**	**F***	**1.15**	**56.6**	**F***	**1.08**	**45.8**	**F***	Y	N
	I-405 SB Ramps	Fairview Road	Sig	0.79	16.0	B	0.72	17.6	B	0.91	20.5	C	0.76	19.7	B	0.92	20.1	C	0.77	18.5	B	N	N	0.97	24.8	C	0.79	19.7	B	0.99	25.7	C	0.81	20.1	C	N	N
	South Coast Drive	I-405 NB off-ramp	Sig	0.19	21.0	C	0.35	24.9	C	0.23	21.6	C	0.39	26.3	C	0.24	21.8	C	0.40	27.1	C	N	N	0.25	22.0	C	0.41	28.3	C	0.27	22.4	C	0.43	30.8	C	N	N
Harbor Boulevard and Hyland Avenue	I-405 NB On-Ramp/ South Coast Drive	Hyland Avenue	Sig	0.26	8.7	A	0.58	8.0	A	0.42	7.8	A	0.64	9.3	A	0.42	7.8	A	0.64	9.3	A	N	N	0.57	9.5	A	0.72	12.0	B	0.52	7.9	A	0.67	10.1	B	N	N
	I-405 SB On-Ramp (from SB Harbor Boulevard)	Harbor Boulevard	None	0.60	--	--	0.65	--	--	0.65	--	--	0.69	--	--	0.65	--	--	0.69	--	--	--	--	0.67	--	--	0.72	--	--	0.67	--	--	0.72	--	--	--	--
	I-405 NB Off-Ramp	Harbor Boulevard	Sig	0.55	19.7	B	0.75	28.3	C	0.61	20.3	C	0.78	28.6	C	0.61	19.5	B	0.78	28.5	C	N	N	0.63	20.6	C	0.81	29.4	C	0.65	20.2	C	0.81	29.4	C	N	N
	I-405 NB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.31	--	--	0.38	--	--	0.33	--	--	0.40	--	--	0.33	--	--	0.40	--	--	--	--	0.35	--	--	0.42	--	--	0.35	--	--	0.42	--	--	--	--
	I-405 SB Off-Ramp	Harbor Boulevard	Sig	0.58	18.3	B	0.71	18.1	B	0.63	18.6	B	0.77	19.5	B	0.63	18.4	B	0.77	19.4	B	N	N	0.65	18.9	B	0.81	20.9	C	0.67	18.9	B	0.80	20.8	C	N	N
	I-405 SB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.42	--	--	0.23	--	--	0.45	--	--	0.25	--	--	0.45	--	--	0.25	--	--	--	--	0.46	--	--	0.26	--	--	0.46	--	--	0.26	--	--	--	--
	Gisler Avenue	Harbor Boulevard	Sig	0.71	26.8	C	0.87	31.8	C	0.77	30.4	C	0.90	33.6	C	0.80	30.6	C	0.89	33.1	C	N	N	0.80	32.2	C	0.97	40.3	D	0.82	32.8	C	0.96	39.3	D	N	N
	Ikea Way	Susan Street/ I-405 NB off-ramp	Sig	0.26	2.9	A	0.33	8.0	A	0.31	6.2	A	0.36	8.5	A	0.32	6.4	A	0.36	8.4	A	N	N	0.35	7.7	A	0.38	8.8	A	0.35	8.0	A	0.37	8.6	A	N	N
Euclid Street and Ellis Avenue	I-405 NB Ramps/ Newhope Street	Euclid Street	Sig	0.48	33.0	C	0.64	37.8	D	0.59	31.3	C	0.82	43.7	D	0.56	30.7	C	0.83	43.9	D	N	N	0.66	34.2	C	0.91	50.9	D	0.64	31.0	C	0.91	49.0	D	N	N
	Ellis Avenue/Euclid Street	I-405 SB ramps	Sig	0.94	46.3	D	0.98	51.2	D	**1.14**	**82.2**	**F**	**1.30**	**141.7**	**F**	N/A			N/A					**1.37**	**158.7**	**F**	**1.51**	**186.3**	**F**	N/A			N/A				
	Ellis Avenue/Euclid Street	I-405 SB ramps (from SB Euclid)	Sig	N/A			N/A			N/A			N/A			0.64	19.2	B	0.76	17.2	B	N	N	N/A			N/A			0.73	22.1	C	0.89	20.0	B	N	N
	Ellis Avenue EB	Proposed I-405 SB ramp	None	N/A			N/A			N/A			N/A			0.75	--	--	0.51	--	--			N/A			N/A			0.99	--	--	0.60	--	--		
Brookhurst Street and Talbert Avenue	Slater Avenue	Brookhurst Street	Sig	0.93	46.5	D	0.81	38.3	D	**1.03**	**57.4**	**F***	0.91	47.0	D	**1.00**	**54.3**	**F***	0.89	42.7	D	Y	N	**1.05**	**67.8**	**F***	**0.97**	**57.6**	**E**	**1.05**	**62.8**	**F***	0.95	52.3	D	Y	N
	I-405 NB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.08	--	--	0.11	--	--	0.12	--	--	0.23	--	--	0.24	--	--	--	--	0.14	--	--	0.14	--	--	0.29	--	--	0.28	--	--	--	--
	I-405 NB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.32	--	--	0.41	--	--	0.39	--	--	0.62	--	--	N/A			N/A					0.43	--	--	0.76	--	--	N/A			N/A				
	I-405 NB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.36	--	--	0.29	--	--	0.42	--	--	0.31	--	--	N/A			N/A					0.45	--	--	0.32	--	--	N/A			N/A				
	I-405 NB Off-Ramp (to NB & SB Brookhurst Street)	Brookhurst Street	Sig	N/A			N/A			N/A			N/A			0.62	13.4	B	0.70	18.4	B			N/A			N/A			0.66	13.9	B	0.72	19.2	B		
	I-405 NB On-Ramp (from NB Brookhurst Street)	Brookhurst Street	None	0.42	--	--	0.43	--	--	0.52	--	--	0.57	--	--	0.52	--	--	0.57	--	--	--	--	0.58	--	--	0.67	--	--	0.58	--	--	0.67	--	--	--	--

Table 4-5: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
Magnolia Street and Warner Avenue	I-405 SB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.83	--	--	0.45	--	--	0.88	--	--	0.48	--	--	0.44	--	--	0.24	--	--	--	--	0.92	--	--	0.50	--	--	0.46	--	--	0.25	--	--	--	--
	I-405 SB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.13	--	--	0.06	--	--	0.14	--	--	N/A			N/A			N	N	0.07	--	--	0.14	--	--	N/A			N/A			N	N
	I-405 SB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.45	--	--	0.45	--	--	0.48	--	--	0.50	--	--	N/A			N/A					0.50	--	--	0.53	--	--	N/A			N/A				
	I-405 SB Off-Ramp (to NB & SB Brookhurst Street)	Brookhurst Street	Sig	N/A			N/A			N/A			N/A			0.55	16.3	B	0.54	14.5	B			N/A			N/A			0.59	15.2	B	0.58	14.9	B		
	Talbert Avenue	Brookhurst Street	Sig	0.95	47.3	D	0.90	47.8	D	**1.24**	**92.8**	**F**	**0.99**	**58.2**	**E**	**1.24**	**92.7**	**F**	0.92	48.1	D	Y	N	**1.40**	**123.5**	**F**	**1.05**	**70.7**	**F***	**1.18**	**94.1**	**F**	**1.04**	**66.0**	**F***	Y	N
	Talbert Avenue	I-405 SB On-Ramp (from EB Talbert Avenue)	None	0.69	--	--	0.46	--	--	0.74	--	--	0.50	--	--	0.37	--	--	0.25	--	--	--	--	0.77	--	--	0.52	--	--	0.38	--	--	0.26	--	--	--	--
	Heil Avenue	Magnolia Street	Sig	0.75	22.3	C	0.51	16.1	B	0.82	25.2	C	0.63	18.5	B	0.83	26.7	C	0.65	18.4	B	N	N	0.87	28.7	C	0.71	20.3	C	0.89	33.0	C	0.78	22.3	C	N	N
	I-405 NB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.07	--	--	0.05	--	--	0.09	--	--	0.05	--	--	0.17	--	--	0.10	--	--	--	--	0.09	--	--	0.05	--	--	0.19	--	--	0.10	--	--	N	N
	I-405 NB Off-Ramp (to NB Magnolia Street)	Magnolia Street	None	0.13	--	--	0.34	--	--	0.16	--	--	0.45	--	--	N/A			N/A			N	N	0.17	--	--	0.52	--	--	N/A			N/A			N	N
	I-405 NB On-Ramp (from NB Magnolia Street)	Magnolia Street	None	0.37	--	--	0.26	--	--	0.40	--	--	0.28	--	--	N/A			N/A					0.42	--	--	0.30	--	--	N/A			N/A				
	I-405 NB Ramps (to NB & SB Magnolia, from NB Magnolia)	Magnolia Street	Sig	N/A			N/A			N/A			N/A			0.47	1.3	A	0.70	6.1	A			N/A			N/A			0.52	1.3	A	0.82	10.3	B		
	I-405 SB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.66	--	--	0.23	--	--	0.71	--	--	0.24	--	--	0.77	9.6	A	0.71	10.9	B	N	N	0.73	--	--	0.25	--	--	0.85	11.7	B	0.80	20.7	C	N	N
	I-405 SB Off-Ramp (to NB and SB Magnolia Street)	Magnolia Street	Sig	0.88	23.1	C	0.77	18.0	B	0.97	36.7	D	0.83	16.7	B									**1.02**	**37.8**	**F***	0.88	20.2	C								
	Warner Avenue	Magnolia Street	Sig	0.91	44.8	D	0.94	47.6	D	**0.98**	**53.1**	**D**	**1.01**	**53.8**	**F***	0.86	46.0	D	0.88	43.8	D	N	N	**1.00**	**62.6**	**F***	**1.07**	**63.0**	**F***	0.99	54.4	D	**1.01**	**58.9**	**F***	Y	N
	I-405 SB On-Ramp (from EB Warner Avenue)	Warner Avenue	None	0.45	--	--	0.23	--	--	0.46	--	--	0.24	--	--	0.46	--	--	0.24	--	--	--	--	0.47	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--	--
	I-405 SB Off-Ramp (to EB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.36	--	--	0.35	--	--	0.38	--	--	0.35	--	--	0.38	--	--	--	--	0.46	--	--	0.40	--	--	0.46	--	--	0.40	--	--	--	--
	I-405 NB Off-Ramp (to WB Warner Avenue)	Warner Avenue	None	0.32	--	--	0.42	--	--	0.34	--	--	0.52	--	--	0.34	--	--	0.52	--	--	--	--	0.35	--	--	0.59	--	--	0.35	--	--	0.59	--	--	--	--
	I-405 NB On-Ramp (from WB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.27	--	--	0.18	--	--	0.29	--	--	0.18	--	--	0.29	--	--	--	--	0.19	--	--	0.30	--	--	0.19	--	--	0.30	--	--	--	--
Beach Boulevard and Edinger Avenue	McFadden Avenue	Beach Boulevard	Sig	0.94	46.3	D	**0.97**	**60.9**	**E**	**1.03**	**72.5**	**F***	**1.05**	**74.7**	**F***	**1.02**	**62.2**	**F***	**1.01**	**64.7**	**F***	Y	N	**1.11**	**81.8**	**F**	**1.13**	**86.6**	**F**	**1.09**	**78.2**	**F***	**1.02**	**75.7**	**F***	Y	N
	I-405 NB On-Ramp (from SB Beach Boulevard)	Beach Boulevard	None	0.18	--	--	0.17	--	--	0.19	--	--	0.18	--	--	N/A			N/A			N	N	0.20	--	--	0.19	--	--	N/A			N/A			N	N
	I-405 NB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.56	--	--	0.60	--	--	0.58	--	--	0.64	--	--	N/A			N/A					0.59	--	--	0.67	--	--	N/A			N/A				
	I-405 NB Off-Ramp (to SB Beach Boulevard)	Beach Boulevard	None	0.46	--	--	0.47	--	--	0.49	--	--	0.62	--	--	N/A			N/A					0.51	--	--	0.72	--	--	N/A			N/A				
	I-405 NB On-Ramp (from NB Beach Boulevard)	Beach Boulevard	None	0.51	--	--	0.61	--	--	0.55	--	--	0.67	--	--	N/A			N/A					0.58	--	--	0.71	--	--	N/A			N/A				

Table 4-5: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
	I-405 NB Ramps	Beach Boulevard	Sig	N/A			N/A			N/A			N/A			0.71	14.8	B	0.80	16.4	B			N/A			N/A			0.77	15.6	B	0.86	19.0	B		
	Center Avenue	Beach Boulevard	Sig	0.72	18.2	B	0.83	17.6	B	0.82	11.5	B	0.93	27.2	C	0.82	12.9	B	0.87	18.0	B	N	N	0.92	19.5	B	**1.00**	**37.8**	**F***	0.91	18.3	B	0.95	26.6	C	N	N
	Center Avenue (Huntington Beach Mall)	I-405 SB ramps	Sig	0.43	15.3	B	0.77	22.9	C	0.58	16.9	B	0.86	28.1	C	0.54	18.8	B	0.74	24.7	C	N	N	0.65	17.5	B	0.92	36.4	D	0.65	18.9	B	0.83	26.7	C	N	N
	I-405 SB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.03	--	--	0.10	--	--	0.03	--	--	0.11	--	--	N/A			N/A					0.03	--	--	0.11	--	--	N/A			N/A				
	Edinger Avenue	Beach Boulevard	Sig	**0.94**	**55.1**	**E**	**0.99**	**59.1**	**E**	**1.06**	**60.6**	**F***	**1.05**	**66.6**	**F***	0.97	50.0	D	**0.98**	**62.7**	**E**	Y	N	**1.15**	**78.9**	**F***	**1.11**	**79.4**	**F***	**1.06**	**62.9**	**F***	**1.07**	**82.7**	**F**	Y	N
	Edinger Avenue	I-405 SB On-Ramp	None	0.60	--	--	0.50	--	--	0.67	--	--	0.52	--	--	0.33	--	--	0.26	--	--	--	--	0.71	--	--	0.54	--	--	0.35	--	--	0.27	--	--	--	--
Goldenwest Street and Bolsa Avenue	I-405 NB On-Ramp (from NB Goldenwest)	Goldenwest Street	None	0.50	--	--	0.53	--	--	0.55	--	--	0.59	--	--	0.28	--	--	0.30	--	--	--	--	0.58	--	--	0.63	--	--	0.29	--	--	0.32	--	--	--	--
	Westminster Mall	I-405 SB ramps	Sig	0.31	6.5	A	0.37	8.9	A	0.36	6.9	A	0.40	9.9	A	0.36	7.1	A	0.40	9.6	A	N	N	0.39	6.8	A	0.42	10.4	B	0.39	8.1	A	0.43	10.1	B	N	N
	Westminster Mall	Goldenwest Street	Sig	0.65	9.3	A	0.61	10.5	B	0.71	10.5	B	0.69	12.1	B	0.59	9.3	A	0.59	7.4	A	N	N	0.76	11.7	B	0.75	13.2	B	0.69	11.1	B	0.69	10.2	B	N	N
	Bolsa Avenue	Goldenwest Street	Sig	0.68	36.0	D	0.95	49.4	D	**0.76**	**36.8**	**D**	**1.00**	**61.8**	**F***	0.71	35.5	D	0.82	45.3	D	N	N	0.80	38.2	D	**1.04**	**72.0**	**F***	0.74	37.5	D	**0.99**	**59.3**	**E**	Y	N
	I-405 SB On-Ramp (from EB Bolsa Avenue)	Bolsa Avenue	None	0.22	--	--	0.49	--	--	0.23	--	--	0.51	--	--	0.11	--	--	0.25	--	--	--	--	0.23	--	--	0.52	--	--	0.12	--	--	0.26	--	--	--	--
	I-405 SB Off-Ramp (to EB Bolsa Avenue)	Bolsa Avenue	Stop	0.35	10.7	B	0.15	10.3	B	0.38	11.0	B	0.17	10.5	B	0.35	10.4	B	0.15	10.1	B	N	N	0.40	11.3	B	0.18	10.7	B	0.37	10.7	B	0.16	10.2	B	N	N
	I-405 NB Off-Ramp (to WB Bolsa Avenue)	Bolsa Avenue	None	0.53	--	--	0.47	--	--	0.58	--	--	0.51	--	--	0.58	--	--	0.51	--	--	--	--	0.61	--	--	0.54	--	--	0.61	--	--	0.54	--	--	--	--
Springdale Street and Westminster Avenue	I-405 SB Off-Ramp	Springdale Street	Stop*	**0.47**	**28.1**	**D**	**0.60**	**36.1**	**E**	**0.67**	**47.9**	**E**	**0.69**	**45.9**	**E**	N/A			N/A			N	N	**0.83**	**76.2**	**F**	**0.85**	**75.8**	**F**	N/A			N/A			N	N
			Sig	N/A			N/A			N/A			N/A			0.35	9.6	A	0.40	9.0	A			N/A			N/A			0.38	9.9	A	0.42	9.2	A		
	Westminster Avenue	Springdale Street	Sig	0.76	39.9	D	0.79	40.1	D	0.83	42.0	D	0.89	44.9	D	0.88	44.2	D	0.89	47.3	D	N	N	0.84	44.1	D	**0.98**	**60.7**	**E**	0.89	47.1	D	**0.97**	**56.8**	**E**	Y	N
	I-405 SB On-Ramp	Westminster Avenue	None	0.24	--	--	0.30	--	--	026	--	--	0.32	--	--	0.51	--	--	0.65	--	--	--	--	0.27	--	--	0.34	--	--	0.27	--	--	0.34	--	--	--	--
	I-405 SB Off-Ramp (to EB Westminster Avenue)	Westminster Avenue	None	0.16	--	--	0.15	--	--	0.18	--	--	0.16	--	--	0.18	--	--	0.16	--	--	--	--	0.19	--	--	0.16	--	--	0.19	--	--	0.16	--	--	--	--
	I-405 NB Off-Ramp (to WB Westminster Avenue)	Westminster Avenue	None	0.40	--	--	0.38	--	--	0.43	--	--	0.43	--	--	N/A			N/A			N	N	0.44	--	--	0.47	--	--	N/A			N/A			N	N
	I-405 NB On-Ramp	Westminster Avenue	None	0.30	--	--	0.28	--	--	0.32	--	--	0.30	--	--	N/A			N/A					0.34	--	--	0.32	--	--	N/A			N/A				
	I-405 NB Ramps (to EB & WB Westminster Avenue)	Westminster Avenue	Sig	N/A			N/A			N/A			N/A			0.64	21.0	C	0.74	16.5	B			N/A			N/A			0.67	21.7	C	0.80	17.9	B		
	Westminster Avenue	Willow Lane	Sig	0.50	14.1	B	0.53	12.6	B	0.58	14.6	B	0.65	14.7	B	0.56	15.1	B	0.61	11.5	B	N	N	0.61	15.4	B	**0.72**	**19.2**	B	0.61	15.6	B	0.68	11.8	B	N	N
Bolsa Chica Road/ Valley View Street/ Garden Grove Boulevard	Garden Grove Boulevard	I-405 NB off-ramp/ SR-22 EB ramps	Sig	0.84	47.3	D	0.93	54.7	D	**0.89**	**55.8**	**E**	**0.99**	**67.6**	**E**	0.85	43.9	D	0.88	43.7	D	N	N	**0.94**	**60.4**	**E**	**1.03**	**75.8**	**F***	0.91	48.7	D	0.94	47.6	D	N	N
	Garden Grove Boulevard	Bolsa Chica Road/ Valley View Street	Sig	0.92	23.7	C	**1.06**	**40.7**	**F***	0.91	23.3	C	**1.00**	**39.1**	**F***	0.90	20.2	C	0.92	25.8	C	N	N	0.99	32.2	C	**1.06**	**57.0**	**F***	0.97	24.6	C	**1.03**	**44.6**	**F***	N	N
	I-405 SB On-Ramp (from SB Bolsa Chica Road)	Bolsa Chica Road	None	0.49	--	--	0.61	--	--	0.63	--	--	0.76	--	--	N/A			N/A			N	N	0.72	--	--	0.86	--	--	N/A			N/A			N	N
	I-405 SB Off-Ramp (to SB Bolsa Chica Road)	Bolsa Chica Road	None	0.55	--	--	0.45	--	--	0.78	--	--	0.65	--	--	N/A			N/A					0.93	--	--	0.78	--	--	N/A			N/A				
	I-405 SB Ramps (to NB & SB Bolsa Chica Road)	Bolsa Chica Road	Sig	N/A			N/A			N/A			N/A			0.72	13.1	B	0.76	9.9	A			N/A			N/A			0.85	15.5	B	0.85	10.8	B		

Table 4-5: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040													
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
Seal Beach Boulevard	I-405 NB Ramps/ Old Ranch Parkway	Seal Beach Boulevard	Sig	0.88	36.0	D	0.92	38.7	D	0.74	27.6	C	0.88	33.3	C	0.61	22.2	C	0.67	26.0	C	N	N	0.82	31.6	C	0.93	40.8	D	0.70	23.6	C	0.84	29.0	C	N	N
	I-405 SB Ramps/ Beverly Manor Road	Seal Beach Boulevard	Sig	**0.95**	**46.4**	**D**	**1.01**	**55.2**	**F***	**1.04**	**57.1**	**F***	**1.12**	**63.1**	**F***	0.80	33.6	C	0.94	41.0	D	N	N	**1.10**	**66.5**	**F***	**1.21**	**81.0**	**F**	0.87	36.0	D	**1.12**	**67.0**	**F***	Y	N
	Old Ranch Pkwy	SR-22 WB On-Ramp	None	0.30	--	--	0.22	--	--	0.32	--	--	0.24	--	--	0.32	--	--	0.24	--	--	--	--	0.34	--	--	0.25	--	--	0.34	--	--	0.25	--	--	--	--
Bear Street at SR-73	SR-73 NB Ramps	Bear Street	Sig	0.50	13.6	B	0.47	12.8	B	0.55	14.1	B	0.53	13.3	B	0.55	16.1	B	0.52	15.0	B	N	N	0.59	14.7	B	0.56	13.8	B	0.59	14.5	B	0.56	13.8	B	N	N
	SR-73 SB Ramps	Bear Street	Sig	0.43	13.1	B	0.51	13.5	B	0.48	13.3	B	0.55	14.3	B	0.49	14.4	B	0.58	16.1	B	N	N	0.52	13.6	B	0.63	15.9	B	0.53	13.7	B	0.67	16.7	B	N	N
Katella Avenue/ Willow Street at I-605	Katella Avenue	I-605 NB on-ramp	Sig	0.64	1.7	A	0.65	3.7	A	0.69	2.5	A	0.73	5.1	A	0.69	2.6	A	0.73	5.0	A	N	N	0.75	3.2	A	0.80	6.6	A	0.75	3.2	A	0.79	6.4	A	N	N
	Katella Avenue	I-605 NB Off-Ramp (to EB Katella Avenue)	None	0.76	--	--	0.49	--	--	0.81	--	--	0.52	--	--	0.81	--	--	0.52	--	--	--	--	0.84	--	--	0.55	--	--	0.84	--	--	0.55	--	--	--	--
	Katella Avenue	I-605 NB Off-Ramp (to WB Katella Avenue)	None	0.03	--	--	0.05	--	--	0.05	--	--	0.07	--	--	0.05	--	--	0.07	--	--	--	--	0.06	--	--	0.08	--	--	0.06	--	--	0.08	--	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from WB Katella Avenue)	None	0.36	--	--	0.44	--	--	0.38	--	--	0.47	--	--	0.38	--	--	0.47	--	--	--	--	0.40	--	--	0.49	--	--	0.40	--	--	0.49	--	--	--	--
	Katella Avenue	I-605 SB Off-Ramp (to EB Katella Avenue)	None	0.80	--	--	0.72	--	--	0.86	--	--	0.76	--	--	0.86	--	--	0.76	--	--	--	--	0.89	--	--	0.79	--	--	0.89	--	--	0.79	--	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from EB Katella Avenue)	None	0.04	--	--	0.03	--	--	0.11	--	--	0.08	--	--	0.11	--	--	0.08	--	--	--	--	0.15	--	--	0.11	--	--	0.15	--	--	0.11	--	--	--	--
	Willow Street	I-605 SB Off-Ramp (to WB Willow Street)	None	0.36	--	--	0.36	--	--	0.39	--	--	0.42	--	--	0.39	--	--	0.42	--	--	--	--	0.41	--	--	0.46	--	--	0.41	--	--	0.46	--	--	--	--

Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio
2. F* = Due to excessive v/c ratio (over 1.0), the intersection is anticipated to operate at LOS F.
3. * = LOS is based on the stop-controlled off-ramp movement (left turn or right turn) with the highest delay.
4. Rows are bold when an intersection is forecast to operate at LOS E or F under no-build or project conditions.
5. Shaded cells indicate an adverse effect/significant impact.
6. N/A = Not applicable because the cell represents a circumstance that does not exist under the specified scenario.
7. -- = LOS and average delay are not calculated from intersections without traffic control. The adverse effect determination applies only to controlled intersections.
8. "Build" refers to all three build alternatives, Alternatives 1, 2, and 3. There is very small variation among the forecast peak hour traffic volumes at the freeway interchanges. The highest of the three alternative forecasts was used for the Build condition, representing a worst-case condition.

Source: Albert Grover & Associates 2011.

Table 4-6: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020													Year 2040													
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
Bristol Street	I-405 NB Off-Ramp/ South Coast Drive	Bristol Street	Sig	0.45	16.4	B	0.73	30.4	C	0.59	19.7	B	0.86	37.1	D	0.59	18.8	B	0.90	38.7	D	N	N	0.70	24.4	C	0.96	44.2	D	0.71	21.9	C	0.98	46.0	D	N	N
	I-405 NB On-Ramp (from NB Bristol Street)	Bristol Street	None	0.08	--	--	0.21	--	--	0.10	--	--	0.22	--	--	0.10	--	--	0.22	--	--	--	--	0.10	--	--	0.23	--	--	0.10	--	--	0.23	--	--	--	--
	I-405 NB On-Ramp (from SB Bristol Street)	Bristol Street	None	0.20	--	--	0.15	--	--	0.23	--	--	0.16	--	--	0.23	--	--	0.16	--	--	--	--	0.25	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	--
	I-405 SB Ramps	Bristol Street	Sig	0.61	15.8	B	0.80	14.8	B	0.63	16.6	B	0.95	19.2	B	0.63	15.5	B	0.96	19.3	B	N	N	0.68	16.3	B	**1.03**	**27.6**	**F***	0.67	17.2	B	**1.05**	**32.0**	**F***	Y	N
Fairview Road and South Coast Drive	I-405 NB Ramps	Fairview Road	Sig	0.93	28.4	C	0.93	24.1	C	**1.06**	**44.0**	**F***	**1.02**	**35.1**	**F***	**1.07**	**44.5**	**F***	**1.02**	**32.9**	**F***	Y	N	**1.14**	**55.5**	**F***	**1.06**	**41.8**	**F***	**1.15**	**56.6**	**F***	**1.08**	**45.8**	**F***	Y	N
	I-405 SB Ramps	Fairview Road	Sig	0.79	16.0	B	0.72	17.6	B	0.91	20.5	C	0.76	19.7	B	0.92	20.1	C	0.77	18.5	B	N	N	0.97	24.8	C	0.79	19.7	B	0.99	25.7	C	0.81	20.1	C	N	N
	South Coast Drive	I-405 NB off-ramp	Sig	0.19	21.0	C	0.35	24.9	C	0.23	21.6	C	0.39	26.3	C	0.24	21.8	C	0.40	27.1	C	N	N	0.25	22.0	C	0.41	28.3	C	0.27	22.4	C	0.43	30.8	C	N	N
Harbor Boulevard and Hyland Avenue	I-405 NB On-Ramp/ South Coast Drive	Hyland Avenue	Sig	0.26	8.7	A	0.58	8.0	A	0.42	7.8	A	0.64	9.3	A	0.42	7.8	A	0.64	9.3	A	N	N	0.57	9.5	A	0.72	12.0	B	0.52	7.9	A	0.67	10.1	B	N	N
	I-405 SB On-Ramp (from SB Harbor Boulevard)	Harbor Boulevard	None	0.60	--	--	0.65	--	--	0.65	--	--	0.69	--	--	0.65	--	--	0.69	--	--	--	--	0.67	--	--	0.72	--	--	0.67	--	--	0.72	--	--	--	--
	I-405 NB Off-Ramp	Harbor Boulevard	Sig	0.55	19.7	B	0.75	28.3	C	0.61	20.3	C	0.78	28.6	C	0.61	19.5	B	0.78	28.5	C	N	N	0.63	20.6	C	0.81	29.4	C	0.65	20.2	C	0.81	29.4	C	N	N
	I-405 NB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.31	--	--	0.38	--	--	0.33	--	--	0.40	--	--	0.33	--	--	0.40	--	--	--	--	0.35	--	--	0.42	--	--	0.35	--	--	0.42	--	--	--	--
	I-405 SB Off-Ramp	Harbor Boulevard	Sig	0.58	18.3	B	0.71	18.1	B	0.63	18.6	B	0.77	19.5	B	0.63	18.4	B	0.77	19.4	B	N	N	0.65	18.9	B	0.81	20.9	C	0.67	18.9	B	0.80	20.8	C	N	N
	I-405 SB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.42	--	--	0.23	--	--	0.45	--	--	0.25	--	--	0.45	--	--	0.25	--	--	--	--	0.46	--	--	0.26	--	--	0.46	--	--	0.26	--	--	--	--
	Gisler Avenue	Harbor Boulevard	Sig	0.71	26.8	C	0.87	31.8	C	0.77	30.4	C	0.90	33.6	C	0.80	30.6	C	0.89	33.1	C	N	N	0.80	32.2	C	0.97	40.3	D	0.82	32.8	C	0.96	39.3	D	N	N
	Ikea Way	Susan Street/ I-405 NB off-ramp	Sig	0.26	2.9	A	0.33	8.0	A	0.31	6.2	A	0.36	8.5	A	0.32	6.4	A	0.36	8.4	A	N	N	0.35	7.7	A	0.38	8.8	A	0.35	8.0	A	0.37	8.6	A	N	N
Euclid Street and Ellis Avenue	I-405 NB Ramps/ Newhope Street	Euclid Street	Sig	0.48	33.0	C	0.64	37.8	D	0.59	31.3	C	0.82	43.7	D	0.56	30.7	C	0.83	43.9	D	N	N	0.66	34.2	C	0.91	50.9	D	0.65	31.1	C	0.94	52.1	D	N	N
	Ellis Avenue/Euclid Street	I-405 SB ramps	Sig	0.94	46.3	D	0.98	51.2	D	**1.14**	**82.2**	**F**	**1.30**	**141.7**	**F**	**1.14**	**80.7**	**F**	**1.31**	**128.0**	**F**	Y	N	**1.37**	**158.7**	**F**	**1.51**	**186.3**	**F**	**1.37**	**155.7**	**F**	**1.52**	**195.6**	**F**	Y	N
Brookhurst Street and Talbert Avenue	Slater Avenue	Brookhurst Street	Sig	0.93	46.5	D	0.81	38.3	D	**1.03**	**57.4**	**F***	**0.91**	**47.0**	**D**	**1.01**	**60.3**	**F***	0.92	44.9	D	Y	N	**1.05**	**67.8**	**F***	**0.97**	**57.6**	**E**	**1.17**	**78.8**	**F***	**1.01**	**64.5**	**F***	Y	Y
	I-405 NB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.08	--	--	0.11	--	--	0.12	--	--	0.11	--	--	0.12	--	--	--	--	0.14	--	--	0.14	--	--	0.14	--	--	0.14	--	--	--	--
	I-405 NB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.32	--	--	0.41	--	--	0.39	--	--	0.62	--	--	0.39	--	--	0.62	--	--	--	--	0.43	--	--	0.76	--	--	0.43	--	--	0.76	--	--	--	--
	I-405 NB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.36	--	--	0.29	--	--	0.42	--	--	0.31	--	--	0.42	--	--	0.31	--	--	--	--	0.45	--	--	0.32	--	--	0.45	--	--	0.32	--	--	--	--
	I-405 NB On-Ramp (from NB Brookhurst Street)	Brookhurst Street	None	0.42	--	--	0.43	--	--	0.52	--	--	0.57	--	--	0.52	--	--	0.57	--	--	--	--	0.58	--	--	0.67	--	--	0.58	--	--	0.67	--	--	--	--
	I-405 SB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.83	--	--	0.45	--	--	0.88	--	--	0.48	--	--	0.88	--	--	0.48	--	--	--	--	0.92	--	--	0.50	--	--	0.92	--	--	0.50	--	--	--	--
	I-405 SB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.13	--	--	0.06	--	--	0.14	--	--	0.06	--	--	0.14	--	--	--	--	0.07	--	--	0.14	--	--	0.07	--	--	0.14	--	--	--	--
	I-405 SB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.45	--	--	0.45	--	--	0.48	--	--	0.50	--	--	0.48	--	--	0.50	--	--	--	--	0.50	--	--	0.53	--	--	0.50	--	--	0.53	--	--	--	--
	Talbert Avenue	Brookhurst Street	Sig	0.95	47.3	D	0.90	47.8	D	**1.24**	**92.8**	**F**	**0.99**	**58.2**	**E**	**1.24**	**92.7**	**F**	**1.01**	**62.2**	**F***	Y	N	**1.40**	**123.5**	**F**	**1.05**	**70.7**	**F***	**1.42**	**128.7**	**F**	**1.12**	**85.3**	**F**	Y	Y
	Talbert Avenue	I-405 SB On-Ramp (from EB Talbert Avenue)	None	0.69	--	--	0.46	--	--	0.74	--	--	0.50	--	--	0.74	--	--	0.50	--	--	--	--	0.77	--	--	0.52	--	--	0.77	--	--	0.52	--	--	--	--

Table 4-6: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020													Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry							No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry							
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	Cumulative Significant Impact	Project Contribution Significant Impact	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	Cumulative Significant Impact	Project Contribution Significant Impact
Magnolia Street and Warner Avenue	Heil Avenue	Magnolia Street	Sig	0.75	22.3	C	0.51	16.1	B	0.82	25.2	C	0.63	18.5	B	0.83	25.5	C	0.65	18.9	B	N	N	0.87	28.7	C	0.71	20.3	C	0.89	32.1	C	0.78	22.4	C	N	N
	I-405 NB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.07	--	--	0.05	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--	--
	I-405 NB Off-Ramp (to NB Magnolia Street)	Magnolia Street	None	0.13	--	--	0.34	--	--	0.16	--	--	0.45	--	--	0.16	--	--	0.45	--	--	--	--	0.17	--	--	0.52	--	--	0.17	--	--	0.52	--	--	--	--
	I-405 NB On-Ramp (from NB Magnolia Street)	Magnolia Street	None	0.37	--	--	0.26	--	--	0.40	--	--	0.28	--	--	0.40	--	--	0.28	--	--	--	--	0.42	--	--	0.30	--	--	0.42	--	--	0.30	--	--	--	--
	I-405 SB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.66	--	--	0.23	--	--	0.71	--	--	0.24	--	--	0.71	--	--	0.24	--	--	--	--	0.73	--	--	0.25	--	--	0.73	--	--	0.25	--	--	--	--
	I-405 SB Off-Ramp (to NB and SB Magnolia Street)	Magnolia Street	Sig	0.88	23.1	C	0.77	18.0	B	0.97	36.7	D	0.83	16.7	B	0.99	38.7	D	0.83	16.4	B	N	N	**1.02**	**37.8**	**F***	0.88	20.2	C	0.85	11.7	B	0.80	20.7	C	N*	N
	Warner Avenue	Magnolia Street	Sig	0.91	44.8	D	0.94	47.6	D	0.98	53.1	D	**1.01**	**53.8**	**F***	0.99	53.3	D	**1.02**	**55.4**	**F***	Y	N	**1.00**	**62.6**	**F***	**1.07**	**63.0**	**F***	**1.03**	**62.5**	**F***	**1.12**	**75.4**	**F***	Y	Y
	I-405 SB On-Ramp (from EB Warner Avenue)	Warner Avenue	None	0.45	--	--	0.23	--	--	0.46	--	--	0.24	--	--	0.46	--	--	0.24	--	--	--	--	0.47	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--	--
	I-405 SB Off-Ramp (to EB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.36	--	--	0.35	--	--	0.38	--	--	0.35	--	--	0.38	--	--	--	--	0.46	--	--	0.40	--	--	0.46	--	--	0.40	--	--	--	--
	I-405 NB Off-Ramp (to WB Warner Avenue)	Warner Avenue	None	0.32	--	--	0.42	--	--	0.34	--	--	0.52	--	--	0.34	--	--	0.52	--	--	--	--	0.35	--	--	0.59	--	--	0.35	--	--	0.59	--	--	--	--
	I-405 NB On-Ramp (from WB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.27	--	--	0.18	--	--	0.29	--	--	0.18	--	--	0.29	--	--	--	--	0.19	--	--	0.50	--	--	0.19	--	--	0.50	--	--	--	--
Beach Boulevard and Edinger Avenue	McFadden Avenue	Beach Boulevard	Sig	0.94	46.3	D	**0.97**	**60.9**	**E**	**1.03**	**72.5**	**F***	**1.05**	**74.7**	**F***	**1.03**	**68.3**	**F***	**1.06**	**76.8**	**F***	Y	N	**1.11**	**81.8**	**F**	**1.13**	**86.6**	**F**	**1.15**	**94.5**	**F**	**1.14**	**92.3**	**F**	Y	Y
	I-405 NB On-Ramp (from SB Beach Boulevard)	Beach Boulevard	None	0.18	--	--	0.17	--	--	0.19	--	--	0.18	--	--	0.19	--	--	0.18	--	--	--	--	0.20	--	--	0.19	--	--	0.20	--	--	0.19	--	--	--	--
	I-405 NB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.56	--	--	0.60	--	--	0.58	--	--	0.64	--	--	0.58	--	--	0.64	--	--	--	--	0.59	--	--	0.67	--	--	0.59	--	--	0.67	--	--	--	--
	I-405 NB Off-Ramp (to SB Beach Boulevard)	Beach Boulevard	None	0.46	--	--	0.47	--	--	0.49	--	--	0.62	--	--	0.49	--	--	0.62	--	--	--	--	0.51	--	--	0.72	--	--	0.51	--	--	0.72	--	--	--	--
	I-405 NB On-Ramp (from NB Beach Boulevard)	Beach Boulevard	None	0.51	--	--	0.61	--	--	0.55	--	--	0.67	--	--	0.55	--	--	0.67	--	--	--	--	0.58	--	--	0.71	--	--	0.58	--	--	0.71	--	--	--	--
	Center Avenue	Beach Boulevard	Sig	0.72	18.2	B	0.83	17.6	B	0.82	11.5	B	0.93	27.2	C	0.85	20.3	C	0.97	28.7	C	N	N	0.92	19.5	B	**1.00**	**37.8**	**F***	0.95	19.8	B	**1.04**	**44.7**	**F***	Y	Y
	Center Avenue (Huntington Beach Mall)	I-405 SB ramps	Sig	0.43	15.3	B	0.77	22.9	C	0.58	16.9	B	0.86	28.1	C	0.58	16.8	B	0.86	28.2	C	N	N	0.65	17.5	B	0.92	36.4	D	0.66	17.5	B	0.92	36.7	D	N	N
	I-405 SB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.03	--	--	0.10	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--	--
	Edinger Avenue	Beach Boulevard	Sig	**0.94**	**55.1**	**E**	**0.99**	**59.1**	**E**	**1.06**	**60.6**	**F***	**1.05**	**66.6**	**F***	**1.08**	**62.8**	**F***	**1.08**	**70.8**	**F***	Y	Y	**1.15**	**78.9**	**F***	**1.11**	**79.4**	**F***	**1.21**	**86.8**	**F**	**1.18**	**89.0**	**F**	Y	Y
	Edinger Avenue	I-405 SB On-Ramp	None	0.60	--	--	0.50	--	--	0.67	--	--	0.52	--	--	0.67	--	--	0.52	--	--	--	--	0.71	--	--	0.54	--	--	0.71	--	--	0.54	--	--	--	--
Goldenwest Street and Bolsa Avenue	I-405 NB On-Ramp (from NB Goldenwest)	Goldenwest Street	None	0.50	--	--	0.53	--	--	0.55	--	--	0.59	--	--	0.55	--	--	0.59	--	--	--	--	0.58	--	--	0.63	--	--	0.58	--	--	0.63	--	--	--	--
	Westminster Mall	I-405 SB ramps	Sig	0.31	6.5	A	0.37	8.9	A	0.36	6.9	A	0.40	9.9	A	0.36	7.0	A	0.40	9.7	A	N	N	0.39	6.8	A	0.42	10.4	B	0.39	7.8	A	0.43	10.4	B	N	N
	Westminster Mall	Goldenwest Street	Sig	0.65	9.3	A	0.61	10.5	B	0.71	10.5	B	0.69	12.1	B	0.72	10.7	B	0.67	12.0	B	N	N	0.76	11.7	B	0.75	13.2	B	0.81	13.2	B	0.79	12.8	B	N	N
	Bolsa Avenue	Goldenwest Street	Sig	0.68	36.0	D	0.95	49.4	D	0.76	36.8	D	**1.00**	**61.8**	**F***	0.75	37.2	D	**0.99**	**60.2**	**E**	Y	N	0.80	38.2	D	**1.04**	**72.0**	**F***	0.84	39.7	D	**1.13**	**85.6**	**F**	Y	Y
	I-405 SB On-Ramp (from EB Bolsa Avenue)	Bolsa Avenue	None	0.22	--	--	0.49	--	--	0.23	--	--	0.51	--	--	0.23	--	--	0.51	--	--	--	--	0.23	--	--	0.52	--	--	0.12	--	--	0.26	--	--	--	--
	I-405 SB Off-Ramp (to EB Bolsa Avenue)	Bolsa Avenue	Stop	0.35	10.7	B	0.15	10.3	B	0.38	11.0	B	0.17	10.5	B	0.38	11.0	B	0.17	10.5	B	N	N	0.40	11.3	B	0.18	10.7	B	0.41	11.7	B	0.18	10.7	B	N	N
	I-405 NB Off-Ramp (to WB Bolsa Avenue)	Bolsa Avenue	None	0.53	--	--	0.47	--	--	0.58	--	--	0.51	--	--	0.58	--	--	0.51	--	--	--	--	0.61	--	--	0.54	--	--	0.61	--	--	0.54	--	--	--	--

Table 4-6: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040													
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution Significant Impact	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution Significant Impact
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		
Springdale Street and Westminster Avenue	I-405 SB off-ramp	Springdale Street	Stop*	0.47	28.1	D	**0.60**	**36.1**	**E**	**0.67**	**47.9**	**E**	**0.69**	**45.9**	**E**	**0.66**	**46.6**	**E**	**0.67**	**42.9**	**E**	Y	N	**0.83**	**76.2**	**F**	**0.85**	**75.8**	**F**	**0.85**	**80.9**	**F**	**0.85**	**76.3**	**F**	Y	N
	Westminster Avenue	Springdale Street	Sig	0.76	39.9	D	0.79	40.1	D	0.83	42.0	D	0.89	44.9	D	0.82	41.5	D	0.89	46.0	D	N	N	0.84	44.1	D	**0.98**	**60.7**	**E**	0.89	46.3	D	**0.97**	**57.2**	**E**	Y	N
	I-405 SB On-Ramp	Westminster Avenue	None	0.24	--	--	0.30	--	--	026	--	--	0.32	--	--	026	--	--	0.32	--	--	--	--	0.27	--	--	0.34	--	--	0.27	--	--	0.34	--	--	--	--
	I-405 SB Off-Ramp (to EB Westminster Avenue)	Westminster Avenue	None	0.16	--	--	0.15	--	--	0.18	--	--	0.16	--	--	0.18	--	--	0.16	--	--	--	--	0.19	--	--	0.16	--	--	0.19	--	--	0.16	--	--	--	--
	I-405 NB Off-Ramp (to WB Westminster Avenue)	Westminster Avenue	None	0.40	--	--	0.38	--	--	0.43	--	--	0.43	--	--	0.43	--	--	0.43	--	--	--	--	0.44	--	--	0.47	--	--	0.44	--	--	0.47	--	--	--	--
	I-405 NB On-Ramp	Westminster Avenue	None	0.30	--	--	0.28	--	--	0.32	--	--	0.30	--	--	0.32	--	--	0.30	--	--	--	--	0.34	--	--	0.32	--	--	0.34	--	--	0.32	--	--	--	--
	Westminster Avenue	Willow Lane	Sig	0.50	14.1	B	0.53	12.6	B	0.58	14.6	B	0.65	14.7	B	0.61	14.7	B	0.65	14.1	B	N	N	0.61	15.4	B	0.72	19.2	B	0.69	17.7	B	0.78	20.6	C	N	N
Bolsa Chica Road/ Valley View Street/ Garden Grove Boulevard	Garden Grove Boulevard	I-405 NB off-ramp/ SR-22 EB ramps	Sig	0.84	47.3	D	0.93	54.7	D	**0.89**	**55.8**	**E**	**0.99**	**67.6**	**E**	**0.90**	**56.1**	**E**	**0.99**	**62.3**	**E**	Y	N	**0.94**	**60.4**	**E**	**1.03**	**75.8**	**F***	0.91	48.7	D	0.94	47.6	D	N*	N
	Garden Grove Boulevard	Bolsa Chica Road/ Valley View Street	Sig	0.92	23.7	C	**1.06**	**40.7**	**F***	0.91	23.3	C	**1.00**	**39.1**	**F***	0.92	24.5	C	**1.03**	**40.1**	**F***	N	N	0.99	32.2	C	**1.06**	**57.0**	**F***	0.99	32.4	C	**1.10**	**65.8**	**F***	Y	Y
	I-405 SB On-Ramp (from SB Bolsa Chica Road)	Bolsa Chica Road	None	0.49	--	--	0.61	--	--	0.63	--	--	0.76	--	--	0.63	--	--	0.76	--	--	--	--	0.72	--	--	0.86	--	--	0.72	--	--	0.86	--	--	--	--
	I-405 SB Off-Ramp (to SB Bolsa Chica Road)	Bolsa Chica Road	None	0.55	--	--	0.45	--	--	0.78	--	--	0.65	--	--	0.78	--	--	0.65	--	--	--	--	0.93	--	--	0.78	--	--	0.93	--	--	0.78	--	--	--	--
Seal Beach Boulevard	I-405 NB Ramps/ Old Ranch Parkway	Seal Beach Boulevard	Sig	0.88	36.0	D	0.92	38.7	D	0.74	27.6	C	0.88	33.3	C	0.74	27.5	C	0.93	34.7	C	N	N	0.82	31.6	C	0.93	40.8	D	0.90	46.5	D	**0.94**	**58.8**	**E**	N	N
	I-405 SB Ramps/ Beverly Manor Road	Seal Beach Boulevard	Sig	0.95	46.4	D	**1.01**	**55.2**	**F***	**1.04**	**57.1**	**F***	**1.12**	**63.1**	**F***	**1.04**	**55.9**	**F***	**1.12**	**62.6**	**F***	Y	N	**1.10**	**66.5**	**F***	**1.21**	**81.0**	**F**	0.87	36.0	D	**1.12**	**67.0**	**F**	Y	N
	Old Ranch Pkwy	SR-22 WB On-Ramp	None	0.30	--	--	0.22	--	--	0.32	--	--	0.24	--	--	0.32	--	--	0.24	--	--	--	--	0.34	--	--	0.25	--	--	0.34	--	--	0.25	--	--	N	N
Bear Street at SR-73	SR-73 NB Ramps	Bear Street	Sig	0.50	13.6	B	0.47	12.8	B	0.55	14.1	B	0.53	13.3	B	0.55	16.1	B	0.52	15.0	B	N	N	0.59	14.7	B	0.56	13.8	B	0.59	14.5	B	0.56	13.8	B	N	N
	SR-73 SB Ramps	Bear Street	Sig	0.43	13.1	B	0.51	13.5	B	0.48	13.3	B	0.55	14.3	B	0.49	14.4	B	0.58	16.1	B	N	N	0.52	13.6	B	0.63	15.9	B	0.53	13.7	B	0.67	16.7	B	N	N
Katella Avenue/ Willow Street at I-605	Katella Avenue	I-605 NB on-ramp	Sig	0.64	1.7	A	0.65	3.7	A	0.69	2.5	A	0.73	5.1	A	0.69	2.6	A	0.73	5.0	A	--	--	0.75	3.2	A	0.80	6.6	A	0.75	3.2	A	0.79	6.4	A	N	N
	Katella Avenue	I-605 NB Off-Ramp (to EB Katella Avenue)	None	0.76	--	--	0.49	--	--	0.81	--	--	0.52	--	--	0.81	--	--	0.52	--	--	--	--	0.84	--	--	0.55	--	--	0.84	--	--	0.55	--	--	--	--
	Katella Avenue	I-605 NB Off-Ramp (to WB Katella Avenue)	None	0.03	--	--	0.05	--	--	0.05	--	--	0.07	--	--	0.05	--	--	0.07	--	--	--	--	0.06	--	--	0.08	--	--	0.06	--	--	0.08	--	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from WB Katella Avenue)	None	0.36	--	--	0.44	--	--	0.38	--	--	0.47	--	--	0.38	--	--	0.47	--	--	--	--	0.40	--	--	0.49	--	--	0.40	--	--	0.49	--	--	--	--
	Katella Avenue	I-605 SB Off-Ramp (to EB Katella Avenue)	None	0.80	--	--	0.72	--	--	0.86	--	--	0.76	--	--	0.86	--	--	0.76	--	--	--	--	0.89	--	--	0.79	--	--	0.89	--	--	0.79	--	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from EB Katella Avenue)	None	0.04	--	--	0.03	--	--	0.11	--	--	0.08	--	--	0.11	--	--	0.08	--	--	--	--	0.15	--	--	0.11	--	--	0.15	--	--	0.11	--	--	--	--
	Willow Street	I-605 SB Off-Ramp (to WB Willow Street)	None	0.36	--	--	0.36	--	--	0.39	--	--	0.42	--	--	0.39	--	--	0.42	--	--	--	--	0.41	--	--	0.46	--	--	0.41	--	--	0.46	--	--	--	--

Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio
2. F* = Due to excessive v/c ratio (over 1.0), the intersection is anticipated to operate at LOS F.
3. * = LOS is based on the stop-controlled off-ramp movement (left turn or right turn) with the highest delay.
4. Rows are bold when an intersection is forecast to operate at LOS E or F under no-build or project conditions.
5. Shaded cells indicate an adverse effect.
6. -- = LOS and average delay are not calculated from intersections without traffic control. The adverse effect determination applies only to controlled intersections.
7. "Build" refers to all three build alternatives, Alternatives 1, 2, and 3. There is very small variation among the forecast peak hour traffic volumes at the freeway interchanges. The highest of the three alternative forecasts was used for the Build condition, representing a worst-case condition.

Source: Albert Grover & Associates 2011.

This page intentionally left blank.

In summary, there are no significant impacts from Alternative 1 on performance or the LOS of the circulation system.

Difference between Future Build Alternatives and Future No Build Alternative Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 1 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. On I-405, between SR-73 and I-605, in 2020, ADT under Alternative 1 is anticipated to be greater than under the no-build condition by 600 to 6,000, compared to the existing condition ADT of 257,000 to 370,000. In 2040, ADT under Alternative 1 is anticipated to be greater than under the no-build condition by 1,000 to 10,000, compared to the existing condition ADT of 257,000 to 370,000 (see Table 3.1.6-2).
2. On I-405, between SR-73 and I-605, in 2020, daily VMT under Alternative 1 is anticipated to be greater than under the no-build condition by 63,000, compared to the existing condition daily VMT of approximately 4 million. In 2040, daily VMT under Alternative 1 is anticipated to be greater than under the no-build condition by 107,000, compared to the existing condition daily VMT of approximately 4 million (see Table 3.1.6-3).
3. There is no difference in the LOS letter grade of F anticipated on I-405 between SR-73 and I-605, under both Alternative 1 and the No Build Alternative, in the GP lanes during peak hours in 2020 and in 2040. Under the existing condition, LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. The peak-hour v/c ratios for the GP lanes in 2020 are anticipated to be 0.05 to 0.27 lower under Alternative 1 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.05 to 0.32 lower under Alternative 1 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. There is no difference in the LOS letter grade of F anticipated on I-405 between SR-73 and I-605 under both Alternative 1 and the No Build Alternative in the HOV lanes during peak hours in 2020 and in 2040. Under the existing condition, LOS conditions range from B to F during peak hours in the HOV lanes. The peak-hour v/c ratios for the HOV lanes in 2020 are anticipated to be 0.05 to 0.27 lower under Alternative 1 than under the No Build Alternative, compared to v/c ratios of 0.58 to 1.08 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.05 to 0.32 lower under Alternative 1 than under the No Build Alternative,

compared to v/c ratios of 0.58 to 1.08 under existing conditions (see Tables 3.1.6-5 and 3.1.6-18).

5. On I-405, between SR-73 and I-605, in 2040, the speeds in the GP lanes during peak hours are anticipated to be 4 to 17 mph faster under Alternative 1 than under the No Build Alternative, compared to speeds under existing conditions ranging from 22 to 54 mph. HOV speeds under Alternative 1 are 4 to 18 mph faster than under the No Build Alternative, compared to existing condition speeds ranging from 43 to 62 mph (see Table 3.1.6-6).
6. On I-405, between SR-73 and I-605, in 2040, the corridor travel time in the GP lanes during peak hours is 74 to 77 minutes less under Alternative 1 than under the No Build Alternative, compared to the corridor travel time under existing conditions ranging from 15 to 37 minutes. The HOV corridor travel time under Alternative 1 is anticipated to be 62 to 67 minutes less than under the No Build Alternative, compared to existing condition corridor travel time ranging from 13 to 19 minutes (see Table 3.1.6-7).
7. Under Alternative 1, on I-405, between SR-73 and I-605, in 2020, daily and annual VHD are anticipated to be approximately 76,000 and 17 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions. Under Alternative 1, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 266,000 and 59 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions (see Table 3.1.6-8).
8. There is almost no difference between the v/c ratios on the branch connectors on I-405, between SR-73 and I-605, under Alternative 1, and the No Build Alternative in 2020 and 2040. The existing condition v/c ratios on the branch connectors range from 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 1, in 2020, there are seven fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions. In 2040, there are five fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours, under Alternative 1, than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-6).
10. In 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be greater by 21 percent under Alternative 1 than under the No Build Alternative, compared to 91 percent of off-ramps with adequate storage at their arterial terminal under existing conditions (see Table 3.1.6-11).

11. In 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be greater by 13 percent under Alternative 1 than under the No Build Alternative, compared to 89 percent of arterials with adequate storage at their intersections with freeway ramps under existing conditions (see Table 3.1.6-11).
12. In 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be greater by 30 percent under Alternative 1 than under the No Build Alternative, compared to 67 percent of arterial/arterial intersections with adequate storage under existing conditions (see Table 3.1.6-11).

Alternative 2

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 2 in 2020 and 2040 to the existing condition reveals the following information. As noted in Section 3.1.6, Traffic and Transportation/Pedestrian and Bicycle Facilities, a single set of future traffic volumes is used for analyzing the project condition at the I-405 interchanges and along arterials. Consequently, the interchange and arterial analysis and conclusions are the same for Alternative 2 and for Alternative 1. The analysis and conclusions related to interchange and arterial analysis are repeated below to provide complete information for Alternative 2.

1. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020, ADT is anticipated to have increased by 52,200 to 83,400, compared to the existing condition. In 2040, ADT is anticipated to have increased by 87,000 to 139,000 (see Table 3.1.6-2).
2. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020, daily VMT is anticipated to have increased by 869,000, compared to the existing condition and by 1,449,000 in 2040 (see Table 3.1.6-3).
3. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS F conditions are anticipated during peak hours in the GP lanes. Under the existing condition, LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. Under Alternative 2, in 2020, v/c ratios range from 0.14 lower than to 0.28 greater than existing conditions. In 2040, v/c ratios range from 0.01 lower than to 0.48 greater than existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS F conditions are anticipated during peak hours in the HOV lanes, except for the northbound segment from SR-22 East to I-605 in 2020. Under the existing condition, LOS conditions range from B to F during peak hours in the HOV lanes. Under Alternative 2, in 2020, v/c

ratios range from 0.05 less than to 0.59 greater than existing conditions. In 2040, v/c ratios range from 0.12 to 0.82 greater than existing conditions (see Tables 3.1.6-5 and 3.1.6-18).

5. Under Alternative 2, on I-405, between SR-73 and I-605, in 2040, speeds in the GP lanes during peak hours range from 16 to 42 mph. Under existing conditions, speeds range from 22 to 54 mph. HOV speeds under Alternative 2 range from 17 to 44 mph in 2040 and 43 to 62 mph under existing conditions (see Table 3.1.6-6).
6. Under Alternative 2, on I-405, from SR-73 to I-605, in 2040, corridor travel time in the GP lanes during peak hours ranges from 20 to 52 minutes and from 15 to 37 minutes under existing conditions. HOV corridor travel time under Alternative 2 ranges from 19 to 50 minutes in 2040 and 13 to 19 minutes under existing conditions (see Table 3.1.6-7).
7. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020, daily and annual VHD are anticipated to be approximately 12,000 and 3 million, respectively. Under Alternative 2, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 66,000 and 14 million, respectively. Under existing conditions, daily and annual VHD are approximately 19,000 and 4 million, respectively (see Table 3.1.6-8).
8. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020, branch connectors are anticipated to operate with v/c ratios ranging from 0.63 to 1.17 in 2020 and from 0.68 to 1.39 in 2040, compared to the existing range of 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 2 with all proposed mitigations, in 2020, there are five intersections anticipated to operate at LOS E or F and four to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions. In 2040, there are 11 intersections anticipated to operate at LOS E or F and 9 to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-5).
10. Under Alternative 2, in 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 100 percent, compared to 91 percent under existing conditions (see Table 3.1.6-11).
11. Under Alternative 2, in 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 86 percent, compared to 89 percent under existing conditions (see Table 3.1.6-11).
12. Under Alternative 2, in 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 80 percent compared to 67 percent under existing conditions (see Table 3.1.6-11).

Table 4-6 shows that, under Alternative 2, in 2020, there are 11 intersections with a significant cumulative impact. The intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-6 also shows that, under Alternative 2, in 2040, there are 14 intersections with a significant cumulative impact.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP and HOV lane v/c ratios cited above in Items 3 and 4, there is a cumulative impact on the freeway mainline.

Future Build Alternative Compared to Future No Build Alternative. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 2 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 2 to cumulative impacts. As shown in Tables 3.1.6-4 and 3.1.6-17, all v/c ratios for the freeway mainline under Alternative 2 are lower than under the No Build Alternative. Therefore, the contribution of Alternative 2 to the cumulative impact on the freeway mainline is less than significant.

Table 4-6 shows (with a "Y" in the column labeled "Project Contribution Significant Impact") that, without mitigation, there are eight intersections with project contributions to cumulative impacts that are significant. Mitigations T-2 through T-9 and T-12, presented in Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those significant impacts. Table 4-5 shows that, with all improvements, including the mitigations, five intersections are anticipated to have significant cumulative impacts in 2020 but in no case is the contribution of Alternative 2 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact"). Table 4-6 shows that, with all improvements, including the mitigations, 10 intersections are anticipated to have significant cumulative impacts in 2040 but in no case is the contribution of Alternative 2 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

In summary, there are no significant impacts from Alternative 2 on the performance or LOS of the circulation system.

Difference between Future Build Alternatives and Future No Build Alternative Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 2 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. On I-405, between SR-73 and I-605, in 2020, ADT under Alternative 2 is anticipated to be greater than under the no-build condition by 1,200 to 12,000, compared to the existing condition ADT of 257,000 to 370,000. In 2040, ADT under Alternative 2 is anticipated to be greater than under the no-build condition by 2,000 to 20,000, compared to the existing condition ADT of 257,000 to 370,000 (see Table 3.1.6-2).
2. On I-405, between SR-73 and I-605, in 2020, daily VMT under Alternative 2 is anticipated to be greater than under the no-build condition by 128,000, compared to the existing condition daily VMT of approximately 4 million. In 2040, daily VMT under Alternative 2 is anticipated to be greater than under the no-build condition by 213,000, compared to the existing condition daily VMT of approximately 4 million (see Table 3.1.6-3).
3. There is no difference in the LOS letter grade of F anticipated on I-405 between SR-73 and I-605 under both Alternative 2 and the No Build Alternative in the GP lanes during peak hours in 2020 and in 2040. Under the existing condition, LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. The peak-hour v/c ratios for the GP lanes in 2020 are anticipated to be 0.05 to 0.46 lower under Alternative 2 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.05 to 0.54 lower under Alternative 2 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. There is no difference in the LOS letter grade of F anticipated on I-405 between SR-73 and I-605 under both Alternative 2 and the No Build Alternative in the HOV lanes during peak hours in 2020 and in 2040, except for the northbound segment from SR-22 East to I-605 in 2020, which operates at LOS D under Alternative 2 and LOS F under the No Build Alternative. Under the existing condition, LOS ranges from B to F during peak hours in the HOV lanes. The peak-hour v/c ratios for the HOV lanes in 2020 are anticipated to be 0.05 to 0.46 lower under Alternative 2 than under the No Build Alternative, compared to v/c ratios of 0.58 to 1.08 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.05 to 0.54 lower under Alternative 2 than under the No Build Alternative, compared to v/c ratios of 0.58 to 1.08 under existing conditions (see Tables 3.1.6-5 and 3.1.6-18).
5. On I-405, between SR-73 and I-605, in 2040, the speeds in the GP lanes during peak hours are anticipated to be 11 to 34 mph faster under Alternative 2 than under the No Build Alternative, compared to speeds under existing conditions ranging from 22 to 54 mph. HOV speeds under Alternative 2 are 11 to 35 mph faster than under the No Build Alternative, compared to existing condition speeds ranging from 43 to 62 mph (see Table 3.1.6-6).

6. On I-405, between SR-73 and I-605, in 2040, the corridor travel time in the GP lanes during peak hours is 87 to 111 minutes less under Alternative 2 than under the No Build Alternative, compared to a corridor travel time under existing conditions ranging from 15 to 37 minutes. The HOV corridor travel time under Alternative 2 is anticipated to be 76 to 97 minutes less than under the No Build Alternative, compared to the existing condition corridor travel time ranging from 13 to 19 minutes (see Table 3.1.6-7).
7. Under Alternative 2, on I-405, between SR-73 and I-605, in 2020, daily and annual VHD are anticipated to be approximately 91,000 and 20 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions. Under Alternative 2, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 348,000 and 76 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions (see Table 3.1.6-8).
8. There is almost no difference between the v/c ratios on the branch connectors on I-405 between SR-73 and I-605 under Alternative 2 and the No Build Alternative in 2020 and 2040. The existing condition v/c ratios on the branch connectors range from 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 2, in 2020, there are seven fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions. In 2040, there are five fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours under Alternative 2 than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-6).
10. In 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be greater by 21 percent under Alternative 2 than under the No Build Alternative, compared to 91 percent of off-ramps with adequate storage at their arterial terminal under existing conditions (see Table 3.1.6-11).
11. In 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be greater by 13 percent under Alternative 2 than under the No Build Alternative, compared to 89 percent of arterials with adequate storage at their intersections with freeway ramps under existing conditions (see Table 3.1.6-11).
12. In 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be greater by 30 percent under Alternative 2 than under the

No Build Alternative, compared to 67 percent of arterial/arterial intersections with adequate storage under existing conditions (see Table 3.1.6-11).

Alternative 3 (Preferred Alternative)

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 3 in 2020 and 2040 to the existing condition reveals the following information. As noted in Section 3.1.6, a single set of future traffic volumes is used for analyzing the project condition at the I-405 interchanges and along arterials. Consequently, the interchange and arterial analysis and conclusions are the same for Alternative 3 as for Alternatives 1 and 2. The analysis and conclusions related to interchange and arterial analysis are repeated below to provide complete information for Alternative 3.

1. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020, ADT is anticipated to have increased by 54,600 to 79,800, compared to the existing condition. In 2040, ADT is anticipated to have increased by 91,000 to 133,000 (see Table 3.1.6-2).
2. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020, daily VMT is anticipated to have increased by 894,000 compared to the existing condition and by 1,491,000 in 2040 (see Table 3.1.6-3).
3. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D northbound from SR-73 to Brookhurst Street during the a.m. peak hour in 2020. Under the existing condition LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. Under Alternative 3, in 2020, v/c ratios range from 0.05 lower to 0.20 greater than existing conditions. In 2040, v/c ratios range from 0.13 to 0.45 greater than existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020 and in 2040, LOS C and D conditions are anticipated during peak hours in the Express Lanes (tolled). Under the existing condition, LOS conditions range from B to F during peak hours in the HOV lanes. Under Alternative 3, in 2020 and 2040, v/c ratios in the Express Lanes are anticipated to range from 0.22 less than to 0.25 greater than v/c ratios in the HOV lanes under existing conditions (see Tables 3.1.6-5 and 3.1.6-18).
5. Under Alternative 3, on I-405, between SR-73 and I-605, in 2040, speeds in the GP lanes during peak hours range from 18 to 38 mph. Under existing conditions, speeds range from 22 to 54 mph. Express Lane speeds under Alternative 3 are anticipated to be managed to maintain a speed of 65 mph in 2040 compared to the range from 43 to 62 mph under existing conditions in the HOV lanes. For both lane types combined, average speeds weighted for the

volumes using each lane type range from 28 to 44 mph in 2040 under Alternative 3, compared to existing condition average speeds of 28 to 56 mph (see Table 3.1.6-6).

6. Under Alternative 3, on I-405, from SR-73 to I-605, in 2040, corridor travel time in the GP lanes during peak hours ranges from 22 to 45 minutes and from 15 to 37 minutes under existing conditions. Express Lane corridor travel time under Alternative 3 is anticipated to be managed to maintain a 13-minute corridor travel time compared to 13 to 19 minutes under existing conditions in the HOV lanes (see Table 3.1.6-7).
7. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020, daily and annual VHD are anticipated to be approximately 10,000 and 2 million, respectively. Under Alternative 3, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 57,000 and 13 million, respectively. Under existing conditions, daily and annual VHD are approximately 19,000 and 4 million, respectively (see Table 3.1.6-8).
8. Under Alternative 3, on I-405, between SR-73 and I-605, branch connectors are anticipated to operate with v/c ratios ranging from 0.47 to 1.35 in 2020 and from 0.47 to 1.57 in 2040, compared to the existing range of 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 3 with all proposed mitigations, in 2020, there are five intersections anticipated to operate at LOS E or F and four to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions. In 2040, there are 11 intersections anticipated to operate at LOS E or F and 9 to have v/c ratios greater than 1.00 during peak hours, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-5).
10. Under Alternative 3, in 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 100 percent, compared to 91 percent under existing conditions (see Table 3.1.6-11).
11. Under Alternative 3, in 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 86 percent compared to 89 percent under existing conditions (see Table 3.1.6-11).
12. Under Alternative 3, in 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 80 percent compared to 67 percent under existing conditions (see Table 3.1.6-11).

Table 4-6 shows that, under Alternative 3, in 2020, there are 11 intersections with a significant cumulative impact. The intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-6 also shows that, under Alternative 3, in 2040, there are 14 intersections with a significant cumulative impact.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP lane v/c ratios cited above in Item 3, there is a cumulative impact on the freeway mainline.

Future Build Alternative Compared to Future No Build. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 3 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 3 to cumulative impacts. As shown in Tables 3.1.6-4 and 3.1.6-17, , all v/c ratios for the freeway mainline under Alternative 3 are lower than under the No Build Alternative. Therefore, the contribution of Alternative 3 to the cumulative impact on the freeway mainline is less than significant.

Table 4-6 shows (with a "Y" in the column labeled "Project Contribution Significant Impact") that, without mitigation, there are eight intersections with project contributions to cumulative impacts that are significant. Mitigations T-2 through T-9 and T-12, presented in Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those significant impacts. Table 4-5 shows that, with all improvements, including the mitigations, five intersections are anticipated to have significant cumulative impacts in 2020 but in no case is the contribution of Alternative 3 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact"). Table 4-6 shows that, with all improvements, including the mitigations, 10 intersections are anticipated to have significant cumulative impacts in 2040 but in no case is the contribution of Alternative 3 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

In summary, there are no significant impacts from Alternative 3 on the performance or LOS of the circulation system.

Difference between Future Build Alternatives and Future No Build Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 3 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. On I-405, between SR-73 and I-605, in 2020, ADT under Alternative 3 is anticipated to be greater than under the no-build condition by 7,200 to 14,400, compared to the existing condition ADT of 257,000 to 370,000. In 2040, ADT under Alternative 3 is anticipated to be greater than under the no-build condition by 12,000 to 24,000, compared to the existing condition ADT of 257,000 to 370,000 (see Table 3.1.6-2).

2. On I-405, between SR-73 and I-605, in 2020, daily VMT under Alternative 3 is anticipated to be greater than under the no-build condition by 153,000 compared to the existing condition daily VMT of approximately 4 million. In 2040, daily VMT under Alternative 3 is anticipated to be greater than under the no-build condition by 255,000, compared to the existing condition daily VMT of approximately 4 million (see Table 3.1.6-3).
3. There is no difference in the LOS letter grade of F anticipated on I-405 between SR-73 and I-605 under both Alternative 3 and the No Build Alternative in the GP lanes during peak hours in 2020 and in 2040, except for LOS D anticipated in 2020 during the a.m. peak hour northbound between SR-73 and Brookhurst Street. Under the existing condition, LOS F conditions occur during peak hours in the GP lanes, except for LOS D in the northbound direction during the a.m. peak hour and southbound during the p.m. peak hour between SR-73 and Brookhurst Street. The peak-hour v/c ratios for the GP lanes in 2020 are anticipated to be 0.11 to 0.35 lower under Alternative 3 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.08 to 0.35 lower under Alternative 3 than under the No Build Alternative, compared to v/c ratios of 0.89 to 1.24 under existing conditions (see Tables 3.1.6-4 and 3.1.6-17).
4. The LOS C or D anticipated in the Alternative 3 Express Lanes in 2020 and 2040 during peak hours is a lower level of congestion than the LOS F anticipated in the HOV lanes under the No Build Alternative. Under the existing condition, LOS ranges from B to F during peak hours in the HOV lanes. The peak-hour v/c ratios for the Express Lanes under Alternative 3 are anticipated to be 0.24 to 0.75 lower in 2020 than for the HOV lanes under the No Build Alternative, compared to v/c ratios for the HOV lanes of 0.58 to 1.08 under existing conditions. In 2040, the v/c ratios are anticipated to be 0.45 to 1.03 lower for the Express Lanes under Alternative 3 than for the HOV lanes under the No Build Alternative, compared to v/c ratios in the HOV lanes of 0.58 to 1.08 under existing conditions (see Tables 3.1.6-5 and 3.1.6-18).
5. On I-405, between SR-73 and I-605, in 2040, the speeds in the GP lanes during peak hours are anticipated to be 13 to 30 mph faster under Alternative 3 than under the No Build Alternative, compared to speeds under existing conditions ranging from 22 to 54 mph. Express Lane speeds under Alternative 3 are 56 to 59 mph faster than HOV lane speeds under the No Build Alternative, compared to existing condition HOV lane speeds ranging from 43 to 62 mph. For both lane types combined, average speeds weighted for the volumes using each lane type range from 23 to 36 mph faster in 2040 under Alternative 3 than under the No Build Alternative, compared to existing condition average speeds of 28 to 56 mph (see Table 3.1.6-6).

6. On I-405, between SR-73 and I-605, in 2040, the corridor travel time in the GP lanes during peak hours is 85 to 118 minutes less under Alternative 3 than under the No Build Alternative, compared to the corridor travel time under existing conditions ranging from 15 to 37 minutes. The Express Lane corridor travel time under Alternative 3 is anticipated to be 82 to 134 minutes less than under the No Build Alternative, compared to the existing condition corridor travel time ranging from 13 to 19 minutes (see Table 3.1.6-7).
7. Under Alternative 3, on I-405, between SR-73 and I-605, in 2020, daily and annual VHD are anticipated to be approximately 93,000 and 20 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions. Under Alternative 3, on I-405, between SR-73 and I-605, in 2040, daily and annual VHD are anticipated to be approximately 356,000 and 78 million less, respectively, than under the No Build Alternative, compared to 19,000 daily and 4 million annual VHD under existing conditions (see Table 3.1.6-8).
8. The forecast volumes and v/c ratios are generally higher for GP branch connectors under Alternative 3 than under the No Build Alternative, and somewhat lower for HOV/Express Lane direct connectors. There are no HOV direct connectors in the existing condition. The existing condition v/c ratios on the branch connectors ranges from 0.53 to 1.17 (see Tables 3.1.6-9 and 3.1.6-20).
9. Under Alternative 3, in 2020, there are seven fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions. In 2040, there are five fewer intersections anticipated to operate at LOS E or F and four fewer to have v/c ratios greater than 1.00 during peak hours under Alternative 3 than under the No Build Alternative, compared to five intersections operating at LOS E or F and two with v/c ratios over 1.00 under existing conditions (see Table 4-6).
10. In 2040, within the project limits, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be greater by 21 percent under Alternative 3 than under the No Build Alternative, compared to 91 percent of off-ramps with adequate storage at their arterial terminal under existing conditions (see Table 3.1.6-11).
11. In 2040, within the project limits, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be greater by 13 percent under Alternative 3 than under the No Build Alternative, compared to 89 percent of arterials with adequate storage at their intersections with freeway ramps under existing conditions (see Table 3.1.6-11).

12. In 2040, within the project limits, the percentage of arterial/arterial intersections with adequate storage is anticipated to be greater by 30 percent under Alternative 3 than under the No Build Alternative, compared to 67 percent of arterial/arterial intersections with adequate storage under existing conditions (see Table 3.1.6-11).

Los Angeles County

Alternative 1

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 1 in 2020 and 2040 to the existing condition reveals the following information. The data used to make the comparison are presented in the tables in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences). Impacts identified through the comparison are cumulative impacts resulting from the combination of the proposed I-405 project and other land development and roadway improvement projects in the corridor and region. The inclusion of other land development and roadway improvement projects in the traffic forecasts is summarized in Section 3.6.5.7, Traffic and Transportation/Pedestrian and Bicycle Facilities (Resources not Subject to Cumulative Analysis), and more fully explained in the Traffic Study in Section 2.2.2.

1. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 7,175 to 8,546 under existing conditions. The volumes anticipated for Alternative 1 in 2020 range from 8,610 to 10,160 and in 2040 from 9,310 to 10,980 (see Figures 3.1.6-8, 3.1.6-19, and 3.1.6-23).
2. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 793 to 1,720 under existing conditions. The volumes anticipated for Alternative 1 in 2020 range from 2,020 to 2,180 and in 2040 from 2,180 to 2,240 (see Figures 3.1.6-8, 3.1.6-19, and 3.1.6-23).
3. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. In 2040, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS E in the southbound direction during the AM and PM peak hours. Under the existing condition, LOS D to F conditions occur during peak hours in the GP lanes. Under Alternative 1 in 2020, v/c ratios in the GP lanes range from 0.02 lower than

under existing conditions to 0.59 greater. In 2040, v/c ratios range from 0.05 to 0.71 greater than under existing conditions (see Tables 3.1.6-13 and 3.1.6-23).

4. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard, HOV lanes are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity ranging from 1.08 to 1.30 in 2020 and from 1.16 to 1.41 in 2040. Under the existing condition, v/c ratios range from 0.50 to 1.06. In 2020, Alternative 1 v/c ratios in the HOV lanes range from 0.06 to 0.71 greater than under existing conditions. In 2040, v/c ratios range from 0.15 to 0.81 greater than under existing conditions (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 1, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.24 to 1.19 in 2020 and from 0.26 to 1.19 in 2040, compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).
6. Under Alternative 1 with all proposed mitigations in 2020, there is 1 Long Beach area study intersection anticipated to operate at LOS E or F, and 4 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c ratios over 1.00 under existing conditions. In 2040, there are 3 intersections anticipated to operate at LOS E or F and 8 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c ratios over 1.00 under existing conditions (see Table 4-7).
7. Under Alternative 1 in 2040 within the Long Beach traffic study area, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 90 percent, compared to 100 percent under existing conditions (see Table 3.1.6-16).
8. Under Alternative 1 in 2040 within the Long Beach traffic study area, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 64 percent, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. Under Alternative 1 in 2040 within the Long Beach traffic study area, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 45 percent, compared to 54 percent under existing conditions (see Table 3.1.6-16).

Table 4-8 shows that, under Alternative 1 in 2020, there are three intersections in the Los Angeles County traffic study area with project contributions to significant cumulative impacts. Those intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-8 also shows that, under Alternative 1 in 2040, there are nine intersections where the proposed project would contribute to significant cumulative impacts.

Table 4-7: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 1 Traffic on Alternative 1 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 1 Traffic on Alternative 1 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.56	18.7	B	0.67	20.1	C	N	N	0.62	22.4	C	0.73	24.5	C	0.61	18.8	B	0.73	20.8	C	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.38	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.41	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.35	--	--	0.36	--	--	--	--	0.35	--	--	0.36	--	--	0.38	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.59	20.3	C	0.76	16.6	B	N	N	0.63	23.6	C	0.82	23.2	C	0.63	21.8	C	0.82	18.4	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.30	--	--	0.35	--	--	--	--	0.33	--	--	0.37	--	--	0.33	--	--	0.37	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.79	30.7	C	0.87	31.6	C	N	N	0.86	35.1	D	0.92	43.9	D	0.87	34.7	C	0.90	41.4	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.0	B	0.64	10.3	B	N	N	0.74	15.4	B	0.71	12.0	B	0.73	15.2	B	0.70	11.4	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.73	9.3	A	0.78	8.1	A	N	N	0.82	11.6	B	0.86	9.8	A	0.79	10.3	B	0.85	9.5	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.43	--	--	0.41	--	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.44	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.22	--	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.24	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.26	--	--	0.22	--	--	--	--	0.25	--	--	0.23	--	--	0.28	--	--	0.24	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.53	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.44	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.25	--	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.27	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.41	--	--	0.46	--	--	--	--	0.46	--	--	0.52	--	--	0.44	--	--	0.50	--	--	--	--
	9	Willow St	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.74	28.9	C	0.96	46.5	D	N	N	0.81	33.6	C	0.93	48.4	D	0.79	33.1	C	0.93	48.7	D	N	N
	10	Willow St	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.48	--	--	--	--
		Willow St	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.28	--	--	0.41	--	--	--	--	0.31	--	--	0.44	--	--	0.31	--	--	0.44	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.51	10.4	B	0.53	10.9	B	N	N	0.55	11.6	B	0.58	11.3	B	0.55	11.3	B	0.58	11.3	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.37	--	--	--	--	0.57	--	--	0.40	--	--	0.55	--	--	0.40	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.29	--	--	0.19	--	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.20	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	1.00	50.1	D	1.00	51.2	D	N	N	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	**1.09**	**68.2**	**E**	**1.10**	**68.1**	**E**	Y	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.64	27.5	C	1.06	44.6	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.71	25.7	C	1.14	53.7	D	N	N
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.12	--	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.13	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.29	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.32	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.3	B	0.47	14.0	B	N	N	0.56	10.6	B	0.51	16.8	B	0.56	10.8	B	0.51	14.7	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	--	0.18	--	--	0.18	--	--	0.27	--	--	0.18	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.77	31.7	C	1.04	36.7	D	N	N	0.87	48.8	D	1.18	45.4	D	0.86	36.4	D	1.20	50.4	D	N	N

Table 4-7: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: LOS	Year 2020: Cumulative Significant Impact	Year 2020: Project Contribution to Significant Impact	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: AM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on Alternative 1 Geometry including Mitigations: PM Peak Hour: LOS	Year 2040: Cumulative Significant Impact	Year 2040: Project Contribution to Significant Impact
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.32**	**146.2**	**F**	0.88	40.9	D	Y	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.43**	**179.2**	**F**	0.94	53.1	D	Y	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.39	--	--	0.20	--	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.22	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.21	--	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.45	--	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.49	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.23	--	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--	--
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.78	17.0	B	0.63	12.0	B	N	N	0.95	21.2	C	0.70	12.6	B	0.96	20.6	C	0.73	13.1	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.15	--	--	0.20	--	--	--	--	0.14	--	--	0.23	--	--	0.17	--	--	0.21	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	12.9	B	0.68	10.2	B	N	N	0.91	15.9	B	0.72	11.3	B	0.91	15.4	B	0.74	11.2	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.86	18.5	B	0.85	21.0	C	N	N	0.94	22.0	C	0.92	24.4	C	0.94	21.7	C	0.93	25.1	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.33	--	--	0.44	--	--	--	--	0.33	--	--	0.50	--	--	0.35	--	--	0.48	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.51	1.2	A	0.50	3.1	A	N	N	0.55	2.8	A	0.51	4.9	A	0.55	1.4	A	0.54	3.2	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**1.03**	**113.3**	**F**	0.51	24.8	C	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.24**	**170.6**	**F**	0.53	25.2	D	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.66*	*8.9*	*A*	*0.65*	*6.2*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.72*	*9.8*	*A*	*0.72*	*7.1*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.54	10.3	B	0.79	14.8	B	N	N	0.60	10.7	B	0.85	15.7	B	0.58	11.1		0.86	16.9	B	N	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.53	13.0	B	0.76	27.3	C	N	N	0.50	13.1	B	0.86	30.4	C	0.52	13.5	B	0.82	29.1	C	N	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	28.9	C	0.96	28.6	C	N	N	0.99	30.4	C	1.03	37.1	D	1.05	43.5	D	1.06	40.4	D	N	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	N/A						N/A						N	N	N/A						N/A						N	N
				Sig*	N/A						0.65	14.1	B	**1.07**	**110.1**	**F**	0.43	10.6	B	0.69	10.8	B			0.71	15.5	B	**1.16**	**147.2**	**F**	0.47	11.2	B	0.67	20.2	C		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.96	36.7	D	0.95	38.7	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	1.09	54.9	D	1.00	52.3	D	N	N
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	0.90	31.3	C	0.80	33.7	C	N	N	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	0.98	37.5	D	0.91	33.0	C	N	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.52	33.5	C	0.56	30.5	C	N	N	0.57	39.1	D	0.82	32.1	C	0.56	35.4	D	0.61	31.1	C	N	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.71	10.8	B	0.94	29.2	C	N	N	0.77	25.7	C	1.02	50.8	D	0.77	11.5	B	1.01	48.2	D	N	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.74	18.3	B	0.77	24.5	C	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	0.80	15.4	B	0.83	39.2	D	N	N
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.04	39.7	D	0.87	16.6	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	**1.13**	**60.6**	**E**	0.95	19.2	B	Y	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.76	14.4	B	0.83	20.0	B	N	N	0.82	17.1	B	0.86	23.7	C	0.82	16.4	B	0.87	24.8	C	N	N

Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions.
   – At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
   – The proposed mitigation includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the mitigation addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 4-8: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 1 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 1 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.56	18.7	B	0.67	20.1	C	N	N	0.62	22.4	C	0.73	24.5	C	0.61	18.8	B	0.73	20.8	C	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.38	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.41	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.35	--	--	0.36	--	--	--	--	0.35	--	--	0.36	--	--	0.38	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.59	20.3	C	0.76	16.6	B	N	N	0.63	23.6	C	0.82	23.2	C	0.63	21.8	C	0.82	18.4	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.30	--	--	0.35	--	--	--	--	0.33	--	--	0.37	--	--	0.33	--	--	0.37	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.79	30.7	C	0.87	31.6	C	N	N	0.86	35.1	D	0.92	43.9	D	0.87	34.7	C	0.90	41.4	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.0	B	0.64	10.3	B	N	N	0.74	15.4	B	0.71	12.0	B	0.73	15.2	B	0.70	11.4	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.73	9.3	A	0.78	8.1	A	N	N	0.82	11.6	B	0.86	9.8	A	0.79	10.3	B	0.85	9.5	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.43	--	--	0.41	--	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.44	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.22	--	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.24	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.26	--	--	0.22	--	--	--	--	0.25	--	--	0.23	--	--	0.28	--	--	0.24	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.53	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.44	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.25	--	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.27	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.41	--	--	0.46	--	--	--	--	0.46	--	--	0.52	--	--	0.44	--	--	0.50	--	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.74	28.9	C	0.96	46.5	D	N	N	0.81	33.6	C	0.93	48.4	D	0.79	33.1	C	0.93	48.7	D	N	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.48	--	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.28	--	--	0.41	--	--	--	--	0.31	--	--	0.44	--	--	0.31	--	--	0.44	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.51	10.4	B	0.53	10.9	B	N	N	0.55	11.6	B	0.58	11.3	B	0.55	11.3	B	0.58	11.3	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.37	--	--	--	--	0.57	--	--	0.40	--	--	0.55	--	--	0.40	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.29	--	--	0.19	--	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.20	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	1.00	50.1	D	1.00	51.2	D	N	N	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	**1.09**	**68.2**	**E**	**1.10**	**68.1**	**E**	Y	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.64	27.5	C	1.06	44.6	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.70	28.1	C	**1.15**	**59.4**	**E**	Y	Y
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.12	--	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.13	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.29	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.32	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.3	B	0.47	14.0	B	N	N	0.56	10.6	B	0.51	16.8	B	0.56	10.8	B	0.51	14.7	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	--	0.18	--	--	0.18	--	--	0.27	--	--	0.18	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.77	31.7	C	1.04	36.7	D	N	N	0.87	48.8	D	1.18	45.4	D	0.86	36.4	D	1.20	50.4	D	N	N

Table 4-8: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Cumulative Significant Impact	Year 2020: Project Contribution to Significant Impact	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Cumulative Significant Impact	Year 2040: Project Contribution to Significant Impact
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.32**	**146.2**	**F**	0.88	40.9	D	Y	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.43**	**179.2**	**F**	0.94	53.1	D	Y	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.39	--	--	0.20	--	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.22	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.21	--	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.45	--	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.49	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.23	--	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--	--
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.78	17.0	B	0.63	12.0	B	N	N	0.95	21.2	C	0.70	12.6	B	0.96	20.6	C	0.73	13.1	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.15	--	--	0.20	--	--	--	--	0.14	--	--	0.23	--	--	0.17	--	--	0.21	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	12.9	B	0.68	10.2	B	N	N	0.91	15.9	B	0.72	11.3	B	0.91	15.4	B	0.74	11.2	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.86	18.5	B	0.85	21.0	C	N	N	0.94	22.0	C	0.92	24.4	C	0.94	21.7	C	0.93	25.1	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.33	--	--	0.44	--	--	--	--	0.33	--	--	0.50	--	--	0.35	--	--	0.48	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.51	1.2	A	0.50	3.1	A	N	N	0.55	2.8	A	0.51	4.9	A	0.55	1.4	A	0.54	3.2	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**1.03**	**113.3**	**F**	0.51	24.8	C	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.24**	**170.6**	**F**	0.53	25.2	D	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.66*	*8.9*	*A*	*0.65*	*6.2*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.72*	*9.8*	*A*	*0.72*	*7.1*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.54	10.3	B	0.79	14.8	B	N	N	0.60	10.7	B	0.85	15.7	B	0.58	11.1	B	0.86	16.9	B	N	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.53	13.0	B	0.76	27.3	C	N	N	0.50	13.1	B	0.86	30.4	C	0.52	13.5	B	0.82	29.1	C	N	N
	28	SR-22 EB On/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	28.9	C	0.96	28.6	C	N	N	0.99	30.4	C	1.03	37.1	D	1.05	43.5	D	1.06	40.4	D	N	N
	29	SR-22 WB On/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	0.43	21.3	C	**0.61**	**88.7**	**F**	0.51	24.3	C	**0.73**	**104.8**	**F**	Y	Y	0.51	25.3	D	**0.84**	**152.1**	**F**	0.61	30.2	D	**1.00**	**184.2**	**F**	Y	Y
				*Sig**	*N/A*						*0.65*	*14.1*	*B*	***1.07****	***110.1***	***F****	*0.70*	*15.1*	*B*	***1.10****	***119.9***	***F****			*0.71*	*15.5*	*B*	***1.16****	***147.2***	***F****	*0.75*	*17.3*	*B*	***1.19****	***156.9***	***F****		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.96	53.2	D	0.96	37.4	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	**1.04**	**71.5**	**E**	**1.04**	**62.4**	**E**	Y	Y
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	**1.06**	**71.4**	**E**	0.96	42.8	D	Y	Y	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	**1.14**	**84.9**	**F**	**1.04**	**57.2**	**E**	Y	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.50	36.6	D	0.69	19.5	B	N	N	0.57	39.1	D	0.82	32.1	C	0.54	36.9	D	0.81	32.0	C	N	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.74	23.2	C	0.95	25.6	C	N	N	0.77	25.7	C	1.02	50.8	D	0.80	24.3	C	**1.03**	**55.3**	**E**	Y	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.79	33.2	C	0.82	35.6	D	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	**0.86**	**55.3**	**E**	**0.89**	**64.3**	**E**	Y	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.03	38.0	D	0.88	14.9	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	**1.13**	**58.6**	**E**	0.97	17.2	B	Y	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.76	14.4	B	0.83	20	B	N	N	0.82	17.1	B	0.86	23.7	C	0.82	16.4	B	0.87	24.8	C	N	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP and HOV lane v/c ratios cited above in Items 3 and 4, there is a cumulative impact on the I-405 freeway mainline.

Future Build Alternative Compared to Future No Build. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 1 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 1 to cumulative impacts. As shown in Tables 3.1.6-13 and 3.1.6-23, v/c ratios for the I-405 freeway mainline under Alternative 1 are 0.00 to 0.11 higher than under the No Build Alternative in 2020 and 0.00 to 0.12 higher in 2040. Because Tables 3.1.6-13 and 3.1.6-23 show that, for segments of I-405 north of I-605 to Lakewood Boulevard, LOS is F under the No Build Alternative or the maximum increase in v/c ratios is 0.02, the contribution of Alternative 1 to the cumulative impact on the freeway mainline is less than significant.

Table 4-8 shows (with a "Y" in the columns labeled "Project Contribution to Significant Impact") that, without mitigation, there are five intersections under Alternative 1 with project contributions to significant cumulative impacts. Measures T-10 and T-11 presented in Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those project contributions to significant cumulative impacts. Table 4-7 shows that, with all improvements, including the mitigations, three intersections are anticipated to have significant cumulative impacts in either 2020 or 2040 but in no case is the contribution of Alternative 1 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

In summary, there are no significant impacts from Alternative 1 on performance or the LOS of the circulation system.

Difference between Alternative 1 and No Build Alternative Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 1 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the no-build condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 20 to 740 greater under Alternative 1 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8,

3.1.6-18, and 3.1.6-19). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 30 to 800 greater under Alternative 1 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-23).

2. Under Alternative 1 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the existing condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 20 lower to 340 greater under Alternative 1 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-18, and 3.1.6-19). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 50 lower to 370 greater under Alternative 1 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-23).
3. Under Alternative 1 and the No Build Alternative on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. Under the existing condition, LOS ranges from D to F depending on the time of day and direction of travel. In 2040, LOS F conditions are anticipated under Alternative 1 during peak hours in the GP lanes, except for LOS E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours; the same LOS conditions are anticipated under the No Build Alternative, except that LOS D is anticipated southbound between I-605 and Studebaker Road during the AM peak hour. Under Alternative 1 in 2020, v/c ratios in the GP lanes range from the same as under the No Build Alternative to 0.11 higher. Under the existing condition, v/c ratios range from 0.81 to 0.98. Under Alternative 1 in 2040, v/c ratios in the GP lanes range from the same as under the No Build Alternative to 0.12 higher (see Tables 3.1.6-13 and 3.1.6-23).
4. Under Alternative 1 and the No Build Alternative in 2020, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity. Under the existing condition, v/c ratios range from 0.50 to 1.06, indicating a range of LOS from A to F depending on time of day and direction of travel. Under Alternative 1 and the No Build Alternative in 2040, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 1 in 2020, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.14 less than to 0.06 greater than under the No Build Alternative compared to the existing

range of 0.31 to 0.81. Under Alternative 1 in 2040, branch connectors in the I-405/I-605/ SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.20 less than to 0.05 greater than under the No Build Alternative compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).

6. Under Alternative 1 with all proposed mitigation in 2020, there are 3 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 1 in 2020, there is 1 fewer intersection anticipated to operate with v/c ratios greater than 1.00 than under the No Build Alternative compared to 3 such intersections in the existing condition. Under Alternative 1 in 2040, there are 6 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 1 in 2040, there are 2 fewer intersection anticipated to operate with v/c ratios greater than 1.00 than under the No Build Alternative compared to 3 such intersections in the existing condition (see Table 4-7).
7. Under Alternative 1 and the No Build Alternative in 2040 within the Long Beach traffic study area, 90 percent of off-ramps are anticipated to have adequate storage at their arterial terminal, compared to 100 percent under existing conditions (see Table 3.1.6-16).
8. In 2040 under Alternative 1 within the Long Beach traffic study area, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 9 percent higher than under the No Build Alternative, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. Under Alternative 1 and the No Build Alternative in 2040 within the Long Beach traffic study area, 45 percent of arterial/arterial intersections are anticipated to have adequate storage, compared to 54 percent under existing conditions (see Table 3.1.6-16).

Alternative 2

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 2 in 2020 and 2040 to the existing condition reveals the following information. The data used to make the comparison are presented in the tables in Section 3.1.6.3, Traffic and Transportation/ Pedestrian and Bicycle Facilities (Environmental Consequences). Impacts identified through the comparison are cumulative impacts resulting from the combination of the proposed I-405 project and other land development and roadway improvement projects in the corridor and region. The inclusion of other land development and roadway improvement projects in the traffic forecasts is summarized in Section 3.6.5.7, Traffic and Transportation/Pedestrian and Bicycle Facilities (Resources not Subject to Cumulative Analysis), and more fully explained in the Traffic Study in Section 2.2.2.

1. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 7,175 to 8,546 under existing conditions. The volumes anticipated for Alternative 2 in 2020 range from 8,690 to 9,930 and in 2040 from 9,400 to 10,740 (see Figures 3.1.6-8, 3.1.6-20, and 3.1.6-24).
2. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 793 to 1,720 under existing conditions. The volumes anticipated for Alternative 2 in 2020 range from 2,020 to 2,160 and in 2040 from 2,180 to 2,330 (see Figures 3.1.6-8, 3.1.6-20, and 3.1.6-24).
3. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. In 2040, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours. Under the existing condition, LOS D to F conditions occur during peak hours in the GP lanes. Under Alternative 2 in 2020, v/c ratios in the GP lanes range from 0.02 lower than under existing conditions to 0.56 greater. In 2040, v/c ratios range from 0.05 to 0.67 greater than under existing conditions (see Tables 3.1.6-13 and 3.1.6-23).
4. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard, HOV lanes are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity ranging from 1.09 to 1.46 in 2020 and from 1.17 to 1.58 in 2040. Under the existing condition, v/c ratios range from 0.50 to 1.06. In 2020, Alternative 2 v/c ratios in the HOV lanes range from 0.05 to 0.69 greater than under existing conditions. In 2040, v/c ratios range from 0.14 to 0.79 greater than under existing conditions (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 2, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.23 to 1.14 in 2020 and from 0.11 to 1.14 in 2040, compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).
6. Under Alternative 2 with all proposed mitigations in 2020, there are 2 Long Beach area study intersections anticipated to operate at LOS E or F, and 5 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c

ratios over 1.00 under existing conditions. In 2040, there are 3 intersections anticipated to operate at LOS E or F and 9 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c ratios over 1.00 under existing conditions (see Table 4-9).

7. Under Alternative 2 in 2040 within the Long Beach traffic study area, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 90 percent, compared to 100 percent under existing conditions (see Table 3.1.6-16).
8. Under Alternative 2 in 2040 within the Long Beach traffic study area, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 64 percent, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. Under Alternative 2 in 2040 within the Long Beach traffic study area, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 49 percent, compared to 54 percent under existing conditions (see Table 3.1.6-16).

Table 4-10 shows that, under Alternative 2 in 2020, there are five intersections in the Long Beach traffic study area with a significant cumulative impact. The intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-10 also shows that, under Alternative 2 in 2040, there are nine intersections with a significant cumulative impact.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP and HOV lane v/c ratios cited above in Items 3 and 4, there is a cumulative impact on the I-405 freeway mainline.

Future Build Alternative Compared to Future No Build. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 2 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 2 to cumulative impacts. As shown in Tables 3.1.6-13 and 3.1.6-23, v/c ratios for the I-405 freeway mainline under Alternative 2 are 0.01 lower to 0.08 higher than under the No Build Alternative in 2020 and 0.00 to 0.08 higher in 2040. Because Tables 3.1.6-13 and 3.1.6-23 show that, for segments of I-405 north of I-605 to Lakewood Boulevard, LOS is F under the No Build Alternative or the maximum increase in v/c ratios is 0.02, the contribution of Alternative 2 to the cumulative impact on the freeway mainline is less than significant.

Table 4-10 shows (with a "Y" in the columns labeled "Project Contribution to Significant Impact") that, without mitigation, there are nine intersections under Alternative 2 with project contributions to cumulative impacts that are significant. Measures T-10 and T-11 presented in

Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those significant impacts. Table 4-9 shows that, with all improvements, including the mitigations, three intersections are anticipated to have significant cumulative impacts in either 2020 or 2040 but in no case is the contribution of Alternative 2 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

In summary, there are no significant impacts from Alternative 2 on performance or the LOS of the circulation system.

Difference between Alternative 2 and No Build Alternative Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 2 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the no-build condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 130 to 510 greater under Alternative 2 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8, 3.1.6-18, and 3.1.6-20). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 140 to 560 greater under Alternative 2 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-24).
2. Under Alternative 2 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the no-build condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 20 lower to 300 greater under Alternative 2 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-18, and 3.1.6-20). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 30 lower to 320 greater under Alternative 2 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-24).

Table 4-9: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 2 Traffic on Alternative 2 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 2 Traffic on Alternative 2 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.58	19.1	B	0.67	20.3	C	N	N	0.62	22.4	C	0.73	24.5	C	0.63	19.3	B	0.73	21.0	C	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.37	--	--	0.36	--	--	--	--	0.35	--	--	0.36	--	--	0.40	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.60	20.1	C	0.75	16.5	B	N	N	0.63	23.6	C	0.82	23.2	C	0.65	21.9	C	0.81	18.1	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.33	--	--	0.36	--	--	--	--	0.33	--	--	0.37	--	--	0.35	--	--	0.39	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.78	34.4	C	0.84	31.2	C	N	N	0.86	35.1	D	0.92	43.9	D	0.86	41.9	D	0.93	39.0	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.5	B	0.57	9.8	A	N	N	0.74	15.4	B	0.71	12.0	B	0.74	15.7	B	0.62	10.8	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.69	7.9	A	0.74	7.7	A	N	N	0.82	11.6	B	0.86	9.8	A	0.75	8.7	A	0.81	8.6	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.42	--	--	0.42	--	--	--	--	0.41	--	--	0.41	--	--	0.46	--	--	0.45	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.39	--	--	0.20	--	--	--	--	0.41	--	--	0.25	--	--	0.43	--	--	0.21	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.23	--	--	0.23	--	--	--	--	0.25	--	--	0.23	--	--	0.25	--	--	0.25	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.54	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.58	--	--	0.44	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.22	--	--	0.25	--	--	--	--	0.24	--	--	0.27	--	--	0.24	--	--	0.27	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.42	--	--	0.47	--	--	--	--	0.46	--	--	0.52	--	--	0.45	--	--	0.51	--	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.75	28.3	C	0.90	44.3	D	N	N	0.81	33.6	C	0.93	48.4	D	0.79	32.2	C	1.02	52.0	D	N	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.49	--	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.31	--	--	0.43	--	--	--	--	0.31	--	--	0.44	--	--	0.34	--	--	0.46	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.52	10.5	B	0.53	11.6	B	N	N	0.55	11.6	B	0.58	11.3	B	0.57	11.3	B	0.58	12.2	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.36	--	--	--	--	0.57	--	--	0.40	--	--	0.56	--	--	0.39	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.30	--	--	0.18	--	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.19	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	**1.02**	**78.0**	**E**	0.99	43.8	D	Y	N	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	**1.07**	**56.6**	**E**	1.08	53.1	D	Y	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.62	27.4	C	1.03	41.2	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.67	27.7	C	1.13	54.2	D	N	N
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.14	--	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.15	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.25	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.27	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.4	B	0.48	14.1	B	N	N	0.56	10.6	B	0.51	16.8	B	0.56	11.0	B	0.52	14.8	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.31	--	--	0.20	--	--	--	--	0.18	--	--	0.18	--	--	0.33	--	--	0.21	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.86	30.7	C	1.09	44.1	D	N	N	0.87	48.8	D	1.18	45.4	D	0.86	46.1	D	**1.17**	**71.7**	**E**	Y	N

Table 4-9: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: D/C	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: LOS	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: D/C	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: LOS	Year 2020: Cumulative Significant Impact	Year 2020: Project Contribution to Significant Impact	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: D/C	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: AM Peak Hour: LOS	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: D/C	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 2 Traffic on Alternative 2 Geometry including Mitigations: PM Peak Hour: LOS	Year 2040: Cumulative Significant Impact	Year 2040: Project Contribution to Significant Impact
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.22**	**136.3**	**F**	0.77	37.4	D	Y	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.38**	**167.9**	**F**	**0.85**	**64.1**	**E**	Y	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.44	--	--	0.23	--	--	--	--	0.42	--	--	0.20	--	--	0.47	--	--	0.25	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.29	--	--	0.21	--	--	--	--	0.34	--	--	0.23	--	--	0.31	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.50	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.44	--	--	0.26	--	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.28	--	--	--	--
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.69	15.3	B	0.59	11.8	B	N	N	0.95	21.2	C	0.70	12.6	B	0.82	17.4	B	0.72	13.3	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.10	--	--	0.19	--	--	--	--	0.14	--	--	0.23	--	--	0.11	--	--	0.20	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.82	13.8	B	0.70	11.3	B	N	N	0.91	15.9	B	0.72	11.3	B	0.89	15.9	B	0.76	12.1	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.83	17.9	B	0.83	20.2	C	N	N	0.94	22.0	C	0.92	24.4	C	0.91	20.3	C	0.92	23.9	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.29	--	--	0.40	--	--	--	--	0.33	--	--	0.50	--	--	0.31	--	--	0.43	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.54	3.3	A	0.52	2.7	A	N	N	0.55	2.8	A	0.51	4.9	A	0.58	3.6	A	0.56	2.8	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**0.90**	**61.5**	**F**	0.61	31.4	D	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.04**	**81.3**	**F**	0.65	33.1	D	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.65*	*8.9*	*A*	*0.65*	*6.1*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.71*	*9.7*	*A*	*0.72*	*7.0*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.59	8.5	A	0.79	15.0	B	N	N	0.60	10.7	B	0.85	15.7	B	0.65	9.5	A	0.86	17.1	B	N	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.49	13.0	B	0.83	28.9	C	N	N	0.50	13.1	B	0.86	30.4	C	0.54	13.4	B	0.89	31.8	C	N	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	30.9	C	0.98	30.1	C	N	N	0.99	30.4	C	1.03	37.1	D	1.06	45.2	D	1.09	43.9	D	N	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	N/A						N/A						N	N	N/A						N/A						N	N
				Sig*	N/A						0.65	14.1	B	**1.07**	**110.1**	**F**	0.46	10.8	B	0.73	12.5	B			0.71	15.5	B	**1.16**	**147.2**	**F**	0.48	12.6	B	0.70	30.1	C		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.94	37.9	D	0.96	39.4	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	1.02	42.9	D	1.04	48.5	D	N	N
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	0.93	32.9	C	0.87	32.8	C	N	N	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	1.01	42.8	D	0.95	39.3	D	N	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.54	34.3	C	0.58	25.7	C	N	N	0.57	39.1	D	0.82	32.1	C	0.58	36.7	D	0.63	30.9	C	N	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.75	10.0	B	0.82	15.2	B	N	N	0.77	25.7	C	1.02	50.8	D	0.81	14.1	B	0.88	18.8	B	N	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.76	15.3	B	0.78	35.0	C	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	0.77	7.8	A	0.83	8.3	A	N	N
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.02	35.6	D	0.88	16.3	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	1.11	51.8	D	0.97	25.8	C	N	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.71	15.8	B	0.81	19.2	B	N	N	0.82	17.1	B	0.86	23.7	C	0.77	18.0	B	0.86	23.4	C	N	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions.
   - At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
   - The proposed mitigation includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the mitigation addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 4-10: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 2 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 2 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.58	19.1	B	0.67	20.3	C	N	N	0.62	22.4	C	0.73	24.5	C	0.63	19.3	B	0.73	21.0	C	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.37	--	--	0.36	--	--	--	--	0.35	--	--	0.36	--	--	0.40	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.60	20.1	C	0.75	16.5	B	N	N	0.63	23.6	C	0.82	23.2	C	0.65	21.9	C	0.81	18.1	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.33	--	--	0.36	--	--	--	--	0.33	--	--	0.37	--	--	0.35	--	--	0.39	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.78	34.4	C	0.84	31.2	C	N	N	0.86	35.1	D	0.92	43.9	D	0.86	41.9	D	0.93	39.0	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.5	B	0.57	9.8	A	N	N	0.74	15.4	B	0.71	12.0	B	0.74	15.7	B	0.62	10.8	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.69	7.9	A	0.74	7.7	A	N	N	0.82	11.6	B	0.86	9.8	A	0.75	8.7	A	0.81	8.6	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.42	--	--	0.42	--	--	--	--	0.41	--	--	0.41	--	--	0.46	--	--	0.45	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.39	--	--	0.20	--	--	--	--	0.41	--	--	0.25	--	--	0.43	--	--	0.21	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.23	--	--	0.23	--	--	--	--	0.25	--	--	0.23	--	--	0.25	--	--	0.25	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.54	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.58	--	--	0.44	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.22	--	--	0.25	--	--	--	--	0.24	--	--	0.27	--	--	0.24	--	--	0.27	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.42	--	--	0.47	--	--	--	--	0.46	--	--	0.52	--	--	0.45	--	--	0.51	--	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.75	28.3	C	0.90	44.3	D	N	N	0.81	33.6	C	0.93	48.4	D	0.79	32.2	C	1.02	52.0	D	N	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.49	--	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.31	--	--	0.43	--	--	--	--	0.31	--	--	0.44	--	--	0.34	--	--	0.46	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.52	10.5	B	0.53	11.6	B	N	N	0.55	11.6	B	0.58	11.3	B	0.57	11.3	B	0.58	12.2	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.36	--	--	--	--	0.57	--	--	0.40	--	--	0.56	--	--	0.39	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.30	--	--	0.18	--	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.19	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.98	39.0	D	**1.16**	**78.7**	**E**	Y	Y	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	1.05	55.0	D	**1.25**	**106.3**	**F**	Y	Y
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.62	27.4	C	1.03	41.2	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.67	27.7	C	1.13	54.2	D	N	N
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.14	--	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.15	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.25	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.27	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.4	B	0.48	14.1	B	N	N	0.56	10.6	B	0.51	16.8	B	0.56	11.0	B	0.52	14.8	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.31	--	--	0.20	--	--	--	--	0.18	--	--	0.18	--	--	0.33	--	--	0.21	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.88	54.7	D	**1.25**	**79.6**	**E**	Y	Y	0.87	48.8	D	1.18	45.4	D	**0.99**	**60.7**	**E**	**1.41**	**101.4**	**F**	Y	Y

Table 4-10: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Cumulative Significant Impact	Year 2020: Project Contribution to Significant Impact	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 2 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 2 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Cumulative Significant Impact	Year 2040: Project Contribution to Significant Impact
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.41**	**203.6**	**F**	0.88	54.3	D	Y	Y	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.53**	**242.2**	**F**	**0.95**	**81.3**	**F**	Y	Y
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.44	--	--	0.23	--	--	--	--	0.42	--	--	0.20	--	--	0.47	--	--	0.25	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.29	--	--	0.21	--	--	--	--	0.34	--	--	0.23	--	--	0.31	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.50	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.44	--	--	0.26	--	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.28	--	--	--	--
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.69	15.3	B	0.59	11.8	B	N	N	0.95	21.2	C	0.70	12.6	B	0.82	17.4	B	0.72	13.3	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.10	--	--	0.19	--	--	--	--	0.14	--	--	0.23	--	--	0.11	--	--	0.20	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.82	13.8	B	0.70	11.3	B	N	N	0.91	15.9	B	0.72	11.3	B	0.89	15.9	B	0.76	12.1	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.83	17.9	B	0.83	20.2	C	N	N	0.94	22.0	C	0.92	24.4	C	0.91	20.3	C	0.92	23.9	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.29	--	--	0.40	--	--	--	--	0.33	--	--	0.50	--	--	0.31	--	--	0.43	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.54	3.3	A	0.52	2.7	A	N	N	0.55	2.8	A	0.51	4.9	A	0.58	3.6	A	0.56	2.8	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**0.90**	**61.5**	**F**	0.61	31.4	D	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.04**	**81.3**	**F**	0.65	33.1	D	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.65*	*8.9*	*A*	*0.65*	*6.1*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.71*	*9.7*	*A*	*0.72*	*7.0*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.59	8.5	A	0.79	15.0	B	N	N	0.60	10.7	B	0.85	15.7	B	0.65	9.5	A	0.86	17.1	B	N	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.49	13.0	B	0.83	28.9	C	N	N	0.50	13.1	B	0.86	30.4	C	0.54	13.4	B	0.89	31.8	C	N	N
	28	SR-22 EB On/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	30.9	C	0.98	30.1	C	N	N	0.99	30.4	C	1.03	37.1	D	1.06	45.2	D	1.09	43.9	D	N	N
	29	SR-22 WB On/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	0.43	21.3	C	**0.61**	**88.7**	**F**	0.62	28.6	D	**1.14**	**172.9**	**F**	Y	Y	0.51	25.3	D	**0.84**	**152.1**	**F**	0.75	38.1	E	**1.59**	**311.8**	**F**	Y	Y
				*Sig**	*N/A*						*0.65*	*14.1*	*B*	***1.07****	***110.1***	***F****	*0.73*	*16.0*	*B*	***1.15****	***131.2***	***F****			*0.71*	*15.5*	*B*	***1.16****	***147.2***	***F****	*0.79*	*19.0*	*B*	***1.24****	***167.4***	***F****		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.96	51.2	D	0.99	39.9	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	**1.04**	**70.0**	**E**	**1.07**	**64.9**	**E**	Y	Y
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	**1.09**	**74.9**	**E**	0.98	46.3	D	Y	Y	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	**1.18**	**92.7**	**F**	**1.06**	**60.9**	**E**	Y	Y
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.51	39.7	D	0.64	19.3	B	N	N	0.57	39.1	D	0.82	32.1	C	0.55	40.2	D	0.74	31.4	C	N	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.73	24.0	C	0.96	24.8	C	N	N	0.77	25.7	C	1.02	50.8	D	0.79	25.4	C	**1.04**	**55.7**	**E**	Y	Y
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.82	45.2	D	0.83	41.7	D	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	**0.89**	**68.4**	**E**	**0.90**	**66.0**	**E**	Y	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.07	46.4	D	0.90	16.1	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	**1.17**	**68.7**	**E**	0.99	19.0	B	Y	Y
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.71	15.8	B	0.81	19.2	B	N	N	0.82	17.1	B	0.86	23.7	C	0.77	18.0	B	0.86	23.4	C	N	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

3. Under Alternative 2 and the No Build Alternative on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. Under the existing condition, LOS ranges from D to F depending on the time of day and direction of travel. In 2040, LOS F conditions are anticipated under Alternative 2 during peak hours in the GP lanes, except for LOS E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours; the same LOS conditions are anticipated under the No Build Alternative, except that LOS D is anticipated southbound between I-605 and Studebaker Road during the AM peak hour. Under Alternative 2 in 2020, v/c ratios in the GP lanes range from 0.01 lower than the No Build Alternative to 0.08 higher. Under the existing condition, v/c ratios range from 0.81 to 0.98. Under Alternative 2 in 2040, v/c ratios in the GP lanes range from the same as under the No Build Alternative to 0.08 higher (see Tables 3.1.6-13 and 3.1.6-23).
4. Under Alternative 2 and the No Build Alternative in 2020, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity. Under the existing condition, v/c ratios range from 0.50 to 1.06, indicating a range of LOS from A to F depending on time of day and direction of travel. Under Alternative 2 and the No Build Alternative in 2040, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 2 in 2020, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.18 less than to 0.01 greater than under the No Build Alternative compared to the existing range of 0.31 to 0.81. Under Alternative 2 in 2040, branch connectors in the I-405/I-605/ SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.29 less than to 0.01 less than under the No Build Alternative compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).
6. Under Alternative 2 with all proposed mitigation in 2020, there are 2 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 2 in 2020, the same number of intersections is anticipated to operate with v/c ratios greater than 1.00 as the No Build Alternative compared to 3 such intersections in the existing condition. Under Alternative 2 in 2040, there are 6 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 2 in 2040, there is 1 fewer intersection anticipated to operate with v/c ratios

greater than 1.00 than under the No Build Alternative compared to 3 such intersections in the existing condition (see Table 4-9).

7. Under Alternative 2 and the No Build Alternative in 2040 within the Long Beach traffic study area, 90 percent of off-ramps are anticipated to have adequate storage at their arterial terminal, compared to 100 percent under existing conditions (see Table 3.1.6-16).
8. Under Alternative 2 and the No Build Alternative in 2040 within the Long Beach traffic study area, 64 percent of arterials are anticipated to have adequate storage at their intersections with freeway ramps, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. In 2040 under Alternative 2 within the Long Beach traffic study area, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 4 percent higher than under the No Build Alternative, compared to 54 percent under existing conditions (see Table 3.1.6-16).

Alternative 3 (Preferred Alternative)

Future Build Alternative Compared to Existing Condition. A comparison of Alternative 3 in 2020 and 2040 to the existing condition reveals the following information. The data used to make the comparison are presented in the tables in Section 3.1.6.3, Traffic and Transportation/ Pedestrian and Bicycle Facilities (Environmental Consequences). Impacts identified through the comparison are cumulative impacts resulting from the combination of the proposed I-405 project and other land development and roadway improvement projects in the corridor and region. The inclusion of other land development and roadway improvement projects in the traffic forecasts is summarized in Section 3.6.5.7, Traffic and Transportation/Pedestrian and Bicycle Facilities (Resources not Subject to Cumulative Analysis), and more fully explained in the Traffic Study in Section 2.2.2.

1. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 7,175 to 8,546 under existing conditions. The volumes anticipated for Alternative 3 in 2020 range from 8,890 to 10,310 and in 2040 from 9,610 to 11,150 (see Figures 3.1.6-8, 3.1.6-21, and 3.1.6-25).
2. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than in the existing condition. For example, between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 793 to 1,720 under existing conditions. The volumes anticipated for

Alternative 3 in 2020 range from 1,740 to 2,130 and in 2040 from 2,280 to 2,670 (see Figures 3.1.6-8, 3.1.6-21, and 3.1.6-25).

3. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. In 2040, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS E in the southbound direction between I-605 and Studebaker Road during the AM peak hour. Under the existing condition, LOS D to F conditions occur during peak hours in the GP lanes. Under Alternative 3 in 2020, v/c ratios in the GP lanes range from 0.01 to 0.61 greater than under existing conditions. In 2040, v/c ratios range from 0.09 to 0.72 greater than under existing conditions (see Tables 3.1.6-13 and 3.1.6-23).
4. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard, HOV lanes are anticipated to operate at LOS F during peak hours in 2020 with v/c ratios in excess of 1.00, except southbound during the AM peak hour; the 2020 v/c ratios in the I-405 HOV lanes range from 0.94 to 1.24 in 2020. Under the existing condition, v/c ratios range from 0.50 to 1.06. In 2040, HOV lanes are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity ranging from 1.25 to 1.65. In 2020, Alternative 3 v/c ratios in the HOV lanes range from 0.05 lower to 0.46 greater than under existing conditions. In 2040, v/c ratios range from 0.19 to 0.86 greater than under existing conditions (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 3, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.24 to 1.12 in 2020 and from 0.26 to 1.12 in 2040, compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).
6. Under Alternative 3 with all proposed mitigations in 2020, there are 2 Long Beach area study intersections anticipated to operate at LOS E or F, and 4 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c ratios over 1.00 under existing conditions. In 2040, there are 3 intersections anticipated to operate at LOS E or F and 11 to have v/c ratios greater than 1.00 during peak hours, compared to 10 intersections operating at LOS E or F and 3 with v/c ratios over 1.00 under existing conditions (see Table 4-11).
7. Under Alternative 3 in 2040 and the existing condition within the Long Beach traffic study area, the percentage of off-ramps with adequate storage at their arterial terminal is anticipated to be 100 percent (see Table 3.1.6-16).

8. Under Alternative 3 in 2040 within the Long Beach traffic study area, the percentage of arterials with adequate storage at their intersections with freeway ramps is anticipated to be 73 percent, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. Under Alternative 3 in 2040 within the Long Beach traffic study area, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 51 percent, compared to 54 percent under existing conditions (see Table 3.1.6-16).

Table 4-12 shows that, under Alternative 3 in 2020, there are five intersections in the Los Angeles County traffic study area with a significant cumulative impact. The intersections are designated on the table with a "Y" (Yes) in the column labeled "Cumulative Significant Impact." Table 4-12 also shows that, under Alternative 3 in 2040, there are nine intersections with a significant cumulative impact.

An increase in the v/c ratio of a freeway segment is an indication of a cumulative impact on the freeway mainline. Based on the increases in freeway GP and HOV lane v/c ratios cited above in Items 3 and 4, there is a cumulative impact on the I-405 freeway mainline.

Future Build Alternative Compared to Future No Build. Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences), provides a comparison of Alternative 3 to the No Build Alternative in 2020 and 2040. That comparison identifies the contribution of Alternative 3 to cumulative impacts. As shown in Tables 3.1.6-13 and 3.1.6-23, v/c ratios for the I-405 freeway mainline under Alternative 3 are 0.03 to 0.13 higher than under the No Build Alternative in 2020 and 0.02 to 0.13 higher in 2040. Because Tables 3.1.6-13 and 3.1.6-23 show that, for segments of I-405 north of I-605 to Lakewood Boulevard, LOS is F under the No Build Alternative or the maximum increase in v/c ratios is 0.05, the contribution of Alternative 3 to the cumulative impact on the freeway mainline is less than significant.

Table 4-12 shows (with a "Y" in the columns labeled "Project Contribution to Significant Impact") that, without mitigation, there are seven intersections under Alternative 3 with project contributions to cumulative impacts that are significant. Measures T-10 and T-11 presented in Section 3.1.6.4, Traffic and Transportation/Pedestrian and Bicycle Facilities (Avoidance, Minimization, and/or Mitigation Measures), are proposed to mitigate those significant impacts. Table 4-11 shows that, with all improvements, including the mitigations, three intersections are anticipated to have significant cumulative impacts in either 2020 or 2040 but in no case is the contribution of Alternative 3 to the cumulative impacts significant (as shown by the "N" in the column labeled "Project Contribution Significant Impact").

Table 4-11: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 3 (Preferred Alternative) Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020														Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 3 Traffic on Alternative 3 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 3 Traffic on Alternative 3 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.64	11.1	B	0.74	13.0	B	N	N	0.62	22.4	C	0.73	24.5	C	0.69	11.7	B	0.80	14.1	B	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.33	--	--	0.37	--	--	--	--	0.35	--	--	0.36	--	--	0.36	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.61	20.9	C	0.75	17.6	B	N	N	0.63	23.6	C	0.82	23.2	C	0.66	22.9	C	0.81	19.4	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.28	--	--	0.30	--	--	--	--	0.33	--	--	0.37	--	--	0.31	--	--	0.33	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.76	31.7	C	0.83	31.8	C	N	N	0.86	35.1	D	0.92	43.9	D	0.84	37.3	D	0.92	44.5	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.70	14.4	B	0.60	9.8	A	N	N	0.74	15.4	B	0.71	12.0	B	0.75	15.5	B	0.64	10.7	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.74	6.1	A	0.75	4.9	A	N	N	0.82	11.6	B	0.86	9.8	A	0.80	7.1	A	0.81	6.0	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.44	--	--	0.43	--	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.46	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.23	--	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.25	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.28	--	--	0.26	--	--	--	--	0.25	--	--	0.23	--	--	0.30	--	--	0.28	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.52	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.45	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.27	--	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.29	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.44	--	--	0.46	--	--	--	--	0.46	--	--	0.52	--	--	0.48	--	--	0.50	--	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.72	31.1	C	0.96	44.3	D	N	N	0.81	33.6	C	0.93	48.4	D	0.77	32.4	C	1.02	52.0	D	N	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.36	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.38	--	--	0.49	--	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.30	--	--	0.43	--	--	--	--	0.31	--	--	0.44	--	--	0.33	--	--	0.46	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.41	9.1	A	0.53	11.1	B	N	N	0.55	11.6	B	0.58	11.3	B	0.45	9.7	A	0.58	11.7	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.54	--	--	0.36	--	--	--	--	0.57	--	--	0.40	--	--	0.59	--	--	0.39	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.32	--	--	0.18	--	--	--	--	0.33	--	--	0.20	--	--	0.34	--	--	0.19	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.92	33.2	C	1.10	48.8	D	N	N	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	0.99	45.9	D	1.08	54.1	D	N	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.64	25.8	C	1.12	50.2	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.70	22.8	C	1.10	53.5	D	N	N
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.09	--	--	0.12	--	--	--	--	0.07	--	--	0.13	--	--	0.09	--	--	0.13	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.37	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.40	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.53	10.2	B	0.52	9.8	A	N	N	0.56	10.6	B	0.51	16.8	B	0.58	11.4	B	0.56	10.2	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.32	--	--	0.17	--	--	--	--	0.18	--	--	0.18	--	--	0.35	--	--	0.19	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.71	32.5	C	0.96	25.4	C	N	N	0.87	48.8	D	1.18	45.4	D	0.73	42.2	D	**1.19**	**62.2**	**E**	Y	N
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.30**	**137.0**	**F**	0.87	37.1	D	Y	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.40**	**166.5**	**F**	0.88	42.2	D	Y	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.40	--	--	0.22	--	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.24	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.22	--	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.52	--	--	0.41	--	--	--	--	0.56	--	--	0.51	--	--	0.56	--	--	0.45	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.24	--	--	--	--	0.45	--	--	0.25	--	--	0.46	--	--	0.26	--	--	--	--

Table 4-11: Years 2020 and 2040 Peak-Hour Intersections LOS after Mitigation with Cumulative and Project Contribution Impact Determinations for Alternative 3 (Preferred Alternative)

Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020													Year 2040													
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 3 Traffic on Alternative 3 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 3 Traffic on Alternative 3 Geometry including Mitigations						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.84	17.0	B	0.69	11.8	B	N	N	0.95	21.2	C	0.70	12.6	B	1.02	22.9	C	0.80	14.0	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.14	--	--	0.22	--	--	--	--	0.14	--	--	0.23	--	--	0.15	--	--	0.23	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	13.8	B	0.69	9.7	A	N	N	0.91	15.9	B	0.72	11.3	B	0.92	16.9	B	0.75	10.3	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.94	22.1	C	0.92	22.9	C	N	N	0.94	22.0	C	0.92	24.4	C	1.02	30.8	C	1.02	29.9	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.35	--	--	0.46	--	--	--	--	0.33	--	--	0.50	--	--	0.38	--	--	0.50	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.63	4.1	A	0.52	4.0	A	N	N	0.55	2.8	A	0.51	4.9	A	0.68	4.5	A	0.56	3.9	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**1.04**	**80.0**	**F**	0.44	20.4	C	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.20**	**116.8**	**F**	0.45	20.1	C	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.69*	*9.3*	*A*	*0.67*	*4.6*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.74*	*7.0*	*A*	*0.73*	*5.5*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.57	8.8	A	0.81	14.6	B	N	N	0.60	10.7	B	0.85	15.7	B	0.62	9.7	A	0.88	17.1	B	N	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.51	12.8	B	0.87	30.2	C	N	N	0.50	13.1	B	0.86	30.4	C	0.55	13.2	B	0.94	35.2	D	N	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.93	25.8	C	0.97	29.0	C	N	N	0.99	30.4	C	1.03	37.1	D	1.02	37.5	D	1.10	44.4	D	N	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	N/A						N/A						Y	N	N/A						N/A						Y	N
				Sig*	N/A						0.65	14.1	B	**1.07**	**110.1**	**F**	0.61	12.1	B	**1.08**	**125.8**	**F**			0.71	15.5	B	**1.16**	**147.2**	**F**	0.66	13.3	B	**1.17**	**88.0**	**F**		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.91	34.8	C	0.95	38.6	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	0.99	51.8	D	0.99	50.3	D	N	N
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	0.93	27.1	C	0.89	33.3	C	N	N	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	1.01	40.8	D	0.92	37.8	D	N	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.59	32.1	C	0.60	27.7	C	N	N	0.57	39.1	D	0.82	32.1	C	0.64	34.8	C	0.66	28.4	C	N	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.73	15.0	B	0.82	13.2	B	N	N	0.77	25.7	C	1.02	50.8	D	0.79	11.5	B	0.88	17.1	B	N	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.67	13.9	B	0.76	24.2	C	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	0.81	15.2	B	0.82	39.2	D	N	N
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	0.99	30.8	C	0.88	16.8	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	1.08	49.7	D	0.97	19.5	B	N	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.77	15.1	B	0.85	21.6	C	N	N	0.82	17.1	B	0.86	23.7	C	0.84	17.5	B	0.85	27.6	C	N	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions.
   - At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
   - The proposed mitigation includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the mitigation addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 4-12: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 3 (Preferred Alternative) – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 3 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact	No Build Traffic on No Build Geometry						Alternative 3 Traffic on No Build Geometry						Cumulative Significant Impact	Project Contribution to Significant Impact
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.64	11.1	B	0.74	13.0	B	N	N	0.62	22.4	C	0.73	24.5	C	0.69	11.7	B	0.80	14.1	B	N	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.33	--	--	0.37	--	--	--	--	0.35	--	--	0.36	--	--	0.36	--	--	0.39	--	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.61	20.9	C	0.75	17.6	B	N	N	0.63	23.6	C	0.82	23.2	C	0.66	22.9	C	0.81	19.4	B	N	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.28	--	--	0.30	--	--	--	--	0.33	--	--	0.37	--	--	0.31	--	--	0.33	--	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.76	31.7	C	0.83	31.8	C	N	N	0.86	35.1	D	0.92	43.9	D	0.84	37.3	D	0.92	44.5	D	N	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/ Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.70	14.4	B	0.60	9.8	A	N	N	0.74	15.4	B	0.71	12.0	B	0.75	15.5	B	0.64	10.7	B	N	N
	6	Spring Street/ Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.74	6.1	A	0.75	4.9	A	N	N	0.82	11.6	B	0.86	9.8	A	0.80	7.1	A	0.81	6.0	A	N	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.44	--	--	0.43	--	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.46	--	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.23	--	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.25	--	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.28	--	--	0.26	--	--	--	--	0.25	--	--	0.23	--	--	0.30	--	--	0.28	--	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.52	--	--	0.41	--	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.45	--	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.27	--	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.29	--	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.44	--	--	0.46	--	--	--	--	0.46	--	--	0.52	--	--	0.48	--	--	0.50	--	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.72	31.1	C	0.96	44.3	D	N	N	0.81	33.6	C	0.93	48.4	D	0.77	32.4	C	1.02	52.0	D	N	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.36	--	--	0.45	--	--	--	--	0.37	--	--	0.50	--	--	0.38	--	--	0.49	--	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.30	--	--	0.43	--	--	--	--	0.31	--	--	0.44	--	--	0.33	--	--	0.46	--	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.41	9.1	A	0.53	11.1	B	N	N	0.55	11.6	B	0.58	11.3	B	0.45	9.7	A	0.58	11.7	B	N	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.54	--	--	0.36	--	--	--	--	0.57	--	--	0.40	--	--	0.59	--	--	0.39	--	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.32	--	--	0.18	--	--	--	--	0.33	--	--	0.20	--	--	0.34	--	--	0.19	--	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.86	32.9	C	**1.15**	**76.5**	**E**	Y	Y	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	0.93	37.7	D	**1.25**	**105.9**	**F**	Y	Y
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.64	25.8	C	1.12	50.2	D	N	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.69	26.0	C	**1.22**	**65.5**	**E**	Y	Y
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.09	--	--	0.12	--	--	--	--	0.07	--	--	0.13	--	--	0.09	--	--	0.13	--	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.37	--	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.40	--	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.53	10.2	B	0.52	9.8	A	N	N	0.56	10.6	B	0.51	16.8	B	0.58	11.4	B	0.56	10.2	B	N	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.32	--	--	0.17	--	--	--	--	0.18	--	--	0.18	--	--	0.35	--	--	0.19	--	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.75	40.9	D	**1.26**	**66.5**	**E**	Y	Y	0.87	48.8	D	1.18	45.4	D	0.86	42.0	D	**1.41**	**92.7**	**F**	Y	Y
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.30**	**137.0**	**F**	0.87	37.1	D	Y	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.40**	**166.5**	**F**	0.88	42.2	D	Y	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.40	--	--	0.22	--	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.24	--	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.22	--	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.52	--	--	0.41	--	--	--	--	0.56	--	--	0.51	--	--	0.56	--	--	0.45	--	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.24	--	--	--	--	0.45	--	--	0.25	--	--	0.46	--	--	0.26	--	--	--	--

Table 4-12: Years 2020 and 2040 Peak-Hour Intersections LOS with Cumulative and Project Contribution Impact Determinations for Alternative 3 (Preferred Alternative) – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Cumulative Significant Impact	Year 2020: Project Contribution to Significant Impact	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 3 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 3 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Cumulative Significant Impact	Year 2040: Project Contribution to Significant Impact
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.84	17.0	B	0.69	11.8	B	N	N	0.95	21.2	C	0.70	12.6	B	1.02	22.9	C	0.80	14.0	B	N	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.14	--	--	0.22	--	--	--	--	0.14	--	--	0.23	--	--	0.15	--	--	0.23	--	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	13.8	B	0.69	9.7	A	N	N	0.91	15.9	B	0.72	11.3	B	0.92	16.9	B	0.75	10.3	B	N	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.94	22.1	C	0.92	22.9	C	N	N	0.94	22.0	C	0.92	24.4	C	1.02	30.8	C	1.02	29.9	C	N	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.35	--	--	0.46	--	--	--	--	0.33	--	--	0.50	--	--	0.38	--	--	0.50	--	--	--	--
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.63	4.1	A	0.52	4.0	A	N	N	0.55	2.8	A	0.51	4.9	A	0.68	4.5	A	0.56	3.9	A	N	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**1.04**	**80.0**	**F**	0.44	20.4	C	N	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.20**	**116.8**	**F**	0.45	20.1	C	N	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.69*	*9.3*	*A*	*0.67*	*4.6*	*A*			*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.74*	*7.0*	*A*	*0.73*	*5.5*	*A*		
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.57	8.8	A	0.81	14.6	B	N	N	0.60	10.7	B	0.85	15.7	B	0.62	9.7	A	0.88	17.1	B	N	N
Studebaker Rd at SR-22/ 7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.51	12.8	B	0.87	30.2	C	N	N	0.50	13.1	B	0.86	30.4	C	0.55	13.2	B	0.94	35.2	D	N	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.93	25.8	C	0.97	29.0	C	N	N	0.99	30.4	C	1.03	37.1	D	1.02	37.5	D	1.10	44.4	D	N	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	0.43	21.3	C	**0.61**	**88.7**	**F**	0.12	19.7	C	**0.32**	**92.6**	**F**	Y	N	0.51	25.3	D	**0.84**	**152.1**	**F**	0.15	22.8	C	**0.45**	**158.2**	**F**	Y	N
				*Sig**	*N/A*						*0.65*	*14.1*	*B*	***1.07****	***110.1***	***F****	*0.61*	*12.1*	*B*	***1.08****	***125.8***	***F****			*0.71*	*15.5*	*B*	***1.16****	***147.2***	***F****	*0.66*	*13.3*	*B*	***1.17****	***88.0***	***F****		
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.92	35.7	D	0.96	36.9	D	N	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	**1.04**	**55.9**	**E**	1.04	49.7	D	Y	Y
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	**1.09**	**66.4**	**E**	1.01	49.6	D	Y	Y	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	**1.17**	**72.3**	**E**	**1.10**	**57.0**	**E**	Y	Y
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.54	30.2	C	0.75	22.1	C	N	N	0.57	39.1	D	0.82	32.1	C	0.58	26.9	C	0.88	26.8	C	N	-N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.75	8.2	A	0.95	25.4	C	N	N	0.77	25.7	C	1.02	50.8	D	0.77	10.2	B	1.04	39.1	D	N	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.80	34.6	C	0.86	47.4	D	N	N	0.85	53.1	D	**0.87**	**58.5**	**E**	**0.87**	**60.0**	**E**	**0.93**	**71.3**	**E**	Y	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.05	45.2	D	0.90	16.0	B	N	N	**1.12**	**55.8**	**E**	0.96	16.7	B	**1.14**	**59.3**	**E**	0.99	18.9	B	Y	Y
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.77	15.1	B	0.85	21.6	C	N	N	0.82	17.1	B	0.86	23.7	C	0.84	17.5	B	0.85	27.6	C	N	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate a cumulative significant impact.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The cumulative significant impact determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

In summary, there are no significant impacts from Alternative 3 on performance or the LOS of the circulation system.

Difference between Alternative 3 and No Build Alternative Related to Existing Condition. A comparison of the existing condition and the difference between Alternative 3 and the No Build Alternative reveals the following information. The data used to make the comparison are presented in the tables indicated in Section 3.1.6.3, Traffic and Transportation/Pedestrian and Bicycle Facilities (Environmental Consequences).

1. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard, GP lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the no-build condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 320 to 890 greater under Alternative 3 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8, 3.1.6-18, and 3.1.6-21). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour GP volumes by direction range from 350 to 970 greater under Alternative 3 than under no-build conditions compared to 7,175 to 8,546 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-25).
2. Under Alternative 3 on I-405 north of I-605 to Lakewood Boulevard, HOV lane volumes during peak hours in 2020 and 2040 are expected to be greater than under the existing condition. In 2020 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 320 lower to 140 greater under Alternative 3 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-18, and 3.1.6-21). In 2040 between Palo Verde Avenue and Woodruff Avenue, peak-hour HOV volumes by direction range from 350 lower to 150 greater under Alternative 3 than under no-build conditions compared to 793 to 1,720 under the existing condition (see Figures 3.1.6-8, 3.1.6-22, and 3.1.6-25).
3. Under Alternative 3 and the No Build Alternative on I-405 north of I-605 to Lakewood Boulevard in 2020, LOS F conditions are anticipated during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively. Under the existing condition, LOS ranges from D to F depending on the time of day and direction of travel. In 2040, LOS F conditions are anticipated under Alternative 3 during peak hours in the GP lanes, except for LOS D and E in the southbound direction between I-605 and Studebaker Road during the AM and PM peak hours, respectively, under the No Build Alternative and LOS E and F under Alternative 3. Under Alternative 3 in 2020, v/c ratios in the GP lanes range from 0.03 to 0.13 higher than the No Build Alternative. Under the existing condition, v/c ratios range from 0.81 to 0.98.

Under Alternative 3 in 2040, v/c ratios in the GP lanes range from 0.02 to 0.13 higher than under the No Build Alternative (see Tables 3.1.6-13 and 3.1.6-23).

4. Under Alternative 3 and the No Build Alternative in 2020, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F with v/c ratios in excess of 1.00 during peak hours, except for southbound during the AM peak hour under Alternative 3. Under the existing condition, v/c ratios range from 0.50 to 1.06 indicating a range of LOS from A to F depending on time of day and direction of travel. Under Alternative 3 and the No Build Alternative in 2040, HOV lanes on I-405 north of I-605 to Lakewood Boulevard are anticipated to operate at LOS F during peak hours because v/c ratios are all forecast to be over capacity (see Tables 3.1.6-14 and 3.1.6-24).
5. Under Alternative 3 in 2020, branch connectors in the I-405/I-605/SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.07 less than to 0.31 greater than under the No Build Alternative compared to the existing range of 0.31 to 0.81. Under Alternative 2 in 2040, branch connectors in the I-405/I-605/ SR-22 interchange serving movements to and from Long Beach are anticipated to operate with v/c ratios ranging from 0.10 less than to 0.25 greater than under the No Build Alternative compared to the existing range of 0.31 to 0.81 (see Tables 3.1.6-15 and 3.1.6-25).
6. Under Alternative 3 with all proposed mitigation in 2020, there are 2 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 3 in 2020, there is 1 fewer intersection anticipated to operate with v/c ratios greater than 1.00 than under the No Build Alternative compared to 3 such intersections in the existing condition. Under Alternative 3 in 2040, there are 6 fewer intersections anticipated to operate at LOS E or F than under the No Build Alternative compared to 10 such intersections in the existing condition. Under Alternative 3 in 2040, there is 1 more intersection anticipated to operate with v/c ratios greater than 1.00 than under the No Build Alternative compared to 3 such intersections in the existing condition (see Table 4-11).
7. In 2040 under Alternative 3 within the Long Beach traffic study area, the percentage of off-ramps with adequate storage is anticipated to be 10 percent higher than under the No Build Alternative, compared to 100 percent under existing conditions (see Table 3.1.6-16).
8. In 2040 under Alternative 3 within the Long Beach traffic study area, the percentage of arterials at ramp intersections with adequate storage is anticipated to be 9 percent higher than under the No Build Alternative, compared to 82 percent under existing conditions (see Table 3.1.6-16).
9. In 2040 under Alternative 3 within the Long Beach traffic study area, the percentage of arterial/arterial intersections with adequate storage is anticipated to be 6 percent higher than

under the No Build Alternative, compared to 54 percent under existing conditions (see Table 3.1.6-16).

4.2.4 Mandatory Findings of Significance

The discussion in this section provides mandatory findings as required in Section 15065 of the CEQA Guidelines.

4.2.4.1 Wildlife and History Mandatory Finding

As described in Sections 3.1.7, Visual/Aesthetics, 3.2.4, Paleontology, and 3.3, Biological Environment, and as determined in Chapter 4 (Sections 4.2.1.3, 4.2.2.2, 4.2.2.3, and 4.2.3.2), the build alternatives' project effects would not significantly degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of a rare or endangered plant or animal. Project impacts on wildlife are less than significant. With incorporation of Mitigation Measure PAL-1, project impacts on history would be less than significant and would not eliminate important examples of the major periods of California history or prehistory.

4.2.4.2 Cumulatively Considerable Effects Mandatory Findings

With impementation of the measures described below in Section 4.2.8, all impacts associated with the build alternatives would be less than significant with mitigation. Similarly, the reasonably foreseeable projects contained within Table 3.6-1 would also be required to address potential impacts through mitigation as part of project approvals required by the implementing jurisdiction in which they are located. There are no unavoidable significant project impacts that would contribute directly or indirectly to potential project effects of the other planned projects in Table 3.6-1. Cumulatively considerable effects would be further minimized through the implementation of all avoidance, minimization, and/or mitigation measures, described in detail in Chapter 3. Cumulatively considerable project effects would be less than significant with mitigation.

4.2.4.3 Adverse Effects on Human Beings Mandatory Findings

Adverse effects on human beings are considered significant temporarily and permanently as it relates to aesthetics and community character of the project area. All of the build alternatives would be under construction for 48 to 54 months depending on the alternative identified. As such, the project would result in:

- More circuitous routing for emergency vehicles associated with closure of ramps or local arterials.
- Increased congestion on the freeway and local streets during construction, resulting in barrier effects that could increase incident response times on the freeway, local streets, and within neighborhoods.
- Impaired (through increased time and distance) automobile and/or pedestrian access to businesses, public services, schools, and other facilities.
- Affecting pedestrian service 0.25- to 0.5-mile in radius of the project during construction and temporarily change/reduce pedestrian access used by the disabled, resulting in a longer route that could indirectly reduce their access to community facilities.
- Increase in local traffic as residents travel longer distances on local streets to enter I-405 at the limited access points.

Subsequent to completion of construction, the project would improve access for all motorists on the affected freeways and local streets by reducing congestion and detours, and improving/ maintaining pedestrian and bicycle facilities. Although the construction impacts would be eliminated after construction has been completed, the impacts to community character would continue to be felt as the project would result in further urbanization due to expanded pavement, which would add additional hardscape, modified new ramps, concrete barriers, and new retaining, tieback, and sound walls. These changes would permanently modify the visual quality of the surrounding communities and, as a result, would affect the existing community character; however, with the consideration of aesthetic features for retaining walls, soundwalls, and bridge structures during final design, some of the project impacts to community character would be minimized.

The community character of the area would be further urbanized with loss of mature landscaping, which currently softens the urban nature of the roadway, until the new landscaping is established. To minimize impacts, additional landscaping is being proposed where existing landscaping is being removed during construction and/or where the expanded ROW allows; however, not all lost landscaping can be replaced.

Most of the overcrossings and undercrossings would be wider to accommodate the additional lanes of I-405 and bringing it to MPAH standards; as a result, this would increase the lengths of the roads and sidewalks that are on the overcrossings or in the undercrossings. Therefore, the amount of time pedestrians and bicyclists spend on these overcrossings or in the undercrossings would increase compared to existing conditions. The new parts of the undercrossings would include lighting for vehicles and pedestrians consistent with local standards; however, the segments of those roads under the existing overcrossings would experience a reduction in the

amount of natural light, which could be perceived by pedestrians and bicyclists as adversely affecting their experiences crossing under I-405. Measures have been proposed to address lighting in the undercrossings during final design, including the provision of appropriate lighting in the new parts of the undercrossings and additional lighting in the existing parts of the undercrossings.

As described in Chapter 3 and Section 4.2.8, all measures to avoid, minimize, and mitigate these potential significant effects have been incorporated into the project; however, the related project effects on the community character within the corridor cannot be fully mitigated.

4.2.5 Unavoidable Significant Environmental Effects

4.2.5.1 Aesthetics Checklist Question c):

As described in Section 3.1.7, Visual/Aesthetics the construction of the build alternatives would result in changes to the visual quality and/or community character associated with vegetation removal, construction activities, and the introduction of new and modified permanent structures. For the build alternatives, the removal of the eucalyptus trees and other vegetation within the interchange areas would likely have the greatest impact on the visual quality; however, this effect would remain until trees grow back to existing conditions. Other elements, such as replacement structures, new retaining walls, and soundwalls, would be a permanent change to the elements within the existing viewsheds along the corridor, including some areas where visual impacts were determined to be Moderately High, as described in Section 3.1.7, Visual/Aesthetics, for Viewpoints 17A and 17B. Avoidance, minimization, and mitigation measures, as stated in Section 4.2.8 and Chapter 3, have been incorporated to reduce significant unavoidable effects on the visual character and quality of the project surroundings to the maximum extent practicable.

4.2.5.2 Mandatory Findings of Significance b):

As described in Section 3.1.6, T-10 and T-11 address mitigation measures related to cumulative intersection operations/impacts in the portions of the study area within Los Angeles County. If these measures are implemented, traffic or transportation-related direct or indirect cumulative impacts are not anticipated to be significant, as discussed in Section 4.2.3.5 (Los Angeles County). However as discussed in T-10 and T-11, since the implementing agencies are City of Long Beach and Caltrans, District 7, and outside the control of the project proponent, should these measures not be implemented, after the fair share mitigation contribution, significant cumulative impacts would continue to occur at those intersections.

4.2.5.3 Mandatory Findings of Significance c):

Project effects on human beings have been mitigated to the maximum extent practicable; however, as described in Section 4.2.4.3, the increased urbanization subsequent to completion of the project (i.e., expanded pavement and ROW, new and widened bridges/overcrossings/ undercrossings, new retaining walls and soundwalls, and replacement/removal of mature vegetation) and the temporary construction-related effects on community character, freeway users, and corridor cities (i.e., 48- to 54-month construction period, increased congestion associated with construction, detours, ramp, lane and arterial closures, potential reduced incident response times. and reduced access to the freeway, businesses. and pedestrian facilities) are considered significant and unavoidable. Caltrans/OCTA has a robust public outreach process for this project, which will continue through completion of the project, and additional feasible measures that are identified during the public outreach process and circulation of the Draft EIR/EIS, and agreed to by Caltrans/OCTA, will be incorporated where feasible to further reduce the significant effects on community character, as described in Section 4.2.4.3. Avoidance, minimization, and mitigation measures, as stated in Section 4.2.8 and Chapter 3, have been incorporated to reduce significant unavoidable effects on the corridor cities and traveling public to the maximum extent practicable.

4.2.6 Significant Irreversible Environmental Changes

Sections 3.4, Relationship between Local Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity, and 3.5, Irreversible and Irretrievable Commitments of Resources that would be involved in the proposed project, describe the potential long-term commitments of resources if a build alternative is implemented.

4.2.7 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to GHGs, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations and World Meteorological Organization's in 1988, has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs related to human activity that include CO_2, methane (CH4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of GHG emissions is electricity generation, followed by transportation. In California, however, transportation sources, including passenger cars, light-duty trucks, other trucks, buses, and motorcycles, make up the largest source of GHG-emitting sources. The dominant GHG emitted is CO_2, which is mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: "Greenhouse Gas Mitigation" and "Adaptation." "Greenhouse Gas Mitigation" is a term for reducing GHG emissions to reduce or "mitigate" the impacts of climate change. "Adaptation" refers to the effort of planning for and adapting to impacts resulting from climate change (e.g., adjusting transportation design standards to withstand more intense storms and higher sea levels)[24].

There are four primary strategies for reducing GHG emissions from transportation sources: (1) improving transportation system and operational efficiencies, (2) reducing travel activity, (3) transitioning to lower GHG-emitting fuels, and (4) improving vehicle technologies/ efficiency. To be most effective, all four should be pursued collectively. The following regulatory setting section outlines state and federal efforts to comprehensively reduce GHG emissions from transportation sources.

Regulatory Setting

State. With the passage of several pieces of legislation, including State Senate and Assembly Bills and Executive Orders, California launched an innovative and proactive approach to dealing with GHG emissions and climate change at the state level.

Assembly Bill (AB 1493), Pavley. Vehicular Emissions: Greenhouse Gases (AB 1493), 2002: Requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009 model year.

Executive Order S-3-05: (signed on June 1, 2005, by Governor Arnold Schwarzenegger). The goal of this Executive Order is to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80 percent below 1990 levels by 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006.

Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006: AB 32 sets the same overall GHG emissions reduction goals as outlined in Executive Order S-3-05, while further

[24] http://climatechange.transportation.org/ghg_mitigation/

mandating that CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of GHGs."

Executive Order S-20-06 (October 18, 2006): This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.

Executive Order S-01-07: Governor Schwarzenegger set forth the low-carbon fuel standard for California. Under this Executive Order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Senate Bill 97 (Chapter 185, 2007): Required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the State CEQA Guidelines for addressing GHG emissions. The Amendments became effective on March 18, 2010.

Senate Bill 375 (SB 375), Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires CARB to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land use, and housing policies to plan for the achievement of the emissions target for their region.

Senate Bill 391 (SB 391) Chapter 585, 2009 California Transportation Plan: This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Federal. Although climate change and GHG reduction is a concern at the federal level, currently there are no regulations or legislation that have been enacted specifically addressing GHG emission reductions and climate change at the project level. Neither EPA nor FHWA has issued explicit guidance or methods to conduct project-level GHG analysis[25]. FHWA supports the approach that climate change considerations should be integrated throughout the transportation decision-making process, from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will assist in decision making and improve efficiency at the program level, and it will inform the analysis and stewardship needs of project-level decision making. Climate change considerations can be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

[25] To date, no national standards have been established regarding mobile source GHGs, nor has EPA established any ambient standards, criteria, or thresholds for GHGs resulting from mobile sources.

The four strategies outlined by FHWA to lessen climate change impacts correlate with efforts that the State is undertaking to deal with transportation and climate change; these strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in travel activity.

Climate change and its associated effects are being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the "National Clean Car Program" and EO 13514- *Federal Leadership in Environmental, Energy and Economic Performance*.

EO 13514 is focused on reducing GHGs internally in federal agency missions, programs, and operations, but it also directed federal agencies to participate in the interagency Climate Change Adaptation Task Force, which is engaged in developing a United States strategy for adaptation to climate change.

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that GHG does fit within the Clean Air Act's definition of a pollutant, and that GHGs are air pollutants covered by the Clean Air Act and that EPA has the authority to regulate GHG. The Court held that the EPA Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. Despite the Supreme Court ruling, there are no promulgated federal regulations to date limiting GHG emissions.

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHG under Section 202(a) of the CAA:

- **Endangerment Finding:** The Administrator found that the current and projected concentrations of the six key well-mixed GHGs – CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and SF_6 – in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing EPA's *Proposed Greenhouse Gas Emission*

Standards for Light-Duty Vehicles, which was published on September 15, 2009[26]. On May 7, 2010, the final *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards* was published in the *Federal Register*.

EPA and the National Highway Traffic Safety Administration (NHTSA) are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations. These steps were outlined by President Obama in a memorandum on May 21, 2010[27].

The final combined EPA and NHTSA standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards implemented by this program are expected to reduce GHG emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

On August 28, 2012, EPA and NHTSA issued a joint Final Rulemaking to extend the National Program for fuel economy standards to model year 2017 through 2025 passenger vehicles. Over the lifetime of the model year 2017-2025 standards, this program is projected to save approximately 4 billion barrels of oil and 2 billion metric tons of GHG emissions.

The complementary EPA and NHTSA standards that make up the Heavy-Duty National Program apply to combination tractors (i.e., semi trucks), heavy-duty pickup trucks and vans, and vocational vehicles, including buses and refuse or utility trucks. Together, these standards will significantly cut GHG emissions and domestic oil use. This program responds to President Barack Obama's 2010 request to jointly establish GHG emissions and fuel efficiency standards for the medium- and heavy-duty highway vehicle sector. The agencies estimate that the combined standards will reduce CO_2 emissions by approximately 270 million metric tons and save approximately 530 million barrels of oil over the life of model year 2014 to 2018 heavy-duty vehicles.

Project Analysis

An individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may participate in a potential impact through its incremental contribution combined with the

[26] http://www.epa.gov/climatechange/endangerment.html

[27] http://epa.gov/otaq/climate/regulations.htm

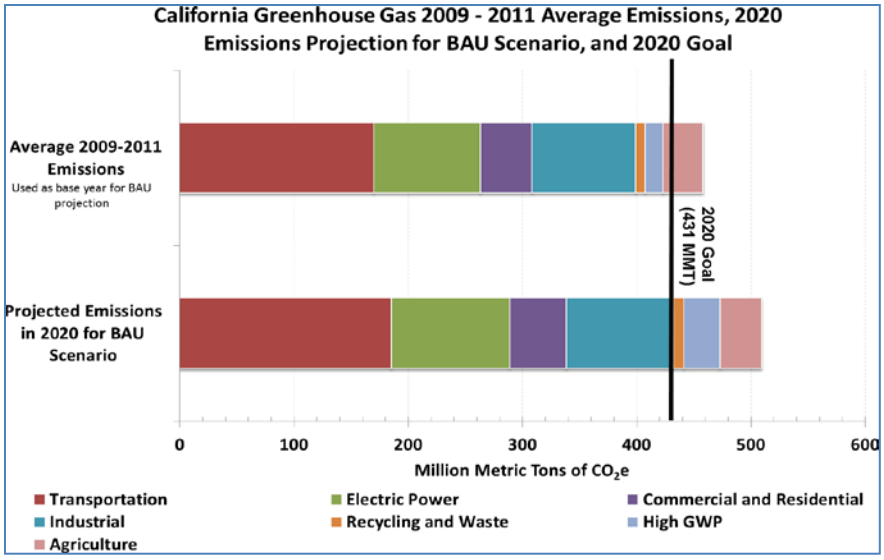
contributions of all other sources of GHG.[28] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable." (See CEQA Guidelines sections 15064(h)(1) and 15130.) To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects to make this determination is a difficult, if not impossible, task.

The AB 32 Scoping Plan and subsequent First Update to the AB 32 Scoping Plan contain the main strategies California will use to reduce GHG. As part of its supporting documentation for the Scoping Plan, CARB released the GHG inventory for California (Forecast last updated: March 24, 2014). The forecast is an estimate of the emissions anticipated to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. In December 2007, CARB approved a total statewide GHG 1990 emissions level and 2020 emissions limit of 427 million metric tons. As part of the update, CARB revised the 2020 Statewide limit to 431 million metric tons, an approximately 1 percent increase from the original estimate. The 2020 business-as-usual (BAU) forecast in the update is 509 million metric tons. The State would need to reduce those emissions by 15 percent to meet the 431-million-metric-ton 2020 limit. The base year used for forecasting emissions is the average of statewide emissions in the GHG inventory for 2006, 2007, and 2008. Figure 4-1 shows the total GHG emissions for California for 2009-2011 average emissions, and 2020 projected emissions for BAU scenario.

Caltrans and its parent agency, the California State Transportation Agency, have taken an active role in addressing GHG emission reductions and climate change. Recognizing that 98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human-made GHG emissions are from transportation, Caltrans has created and is implementing the Climate Action Program at Caltrans, which was published in December 2006 (see Climate Action Program at Caltrans [December 2006[29]]).

[28] This approach is supported by the AEP: *Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the SCAQMD (Chapter 6: : The CEQA Guide, April 2011) and the US Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).

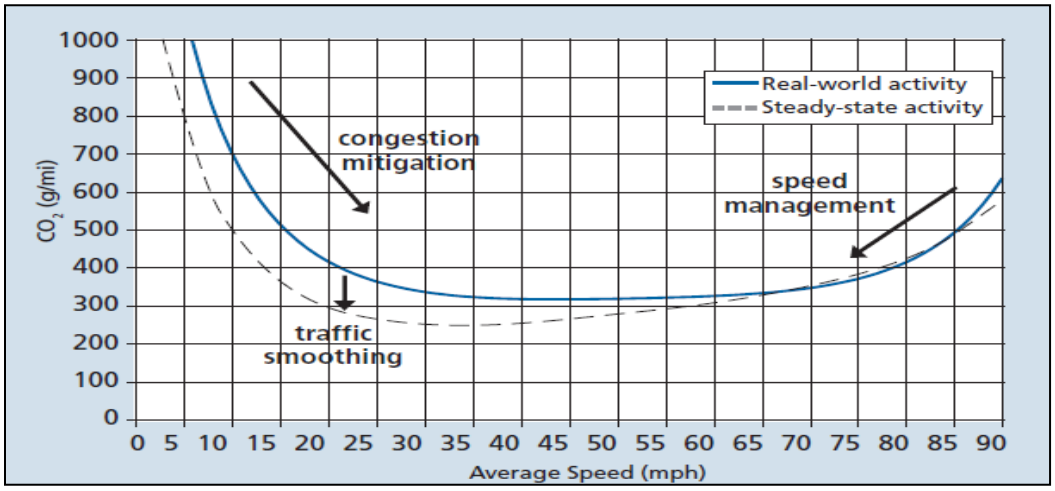
[29] Caltrans Climate Action Program is located at the following web address: http://www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf



Source: http://www.arb.ca.gov/cc/inventory/data/forecast.htm

Figure 4-1: 2020 Business-as-Usual (BAU) Emissions Projection 2014 Edition

One of the main strategies in the Caltrans Climate Action Program to reduce GHG emissions is to make California's transportation system more efficient. As shown in Figure 4-2, the highest levels of CO_2 from mobile sources, such as automobiles, occur at stop-and-go speeds (0 to 25 mph) and speeds greater than 55 mph; the most severe emissions occur from 0 to 25 mph. To the extent that a project relieves congestion by enhancing operations and improving travel times in high-congestion travel corridors, GHG emissions, particularly CO_2, may be reduced. The purpose of the proposed project is to relieve congestion and improve operational efficiency on I-405 between SR-73 and I-605.



Source: ***Traffic Congestion and Greenhouse Gases:*** *Matthew Barth and Kanok Boriboonsomsin (TR News 268 May-June 2010)<http://onlinepubs.trb.org/onlinepubs/trnews/trnews268.pdf>*

Figure 4-2: Possible Effect of Traffic Operation Strategies in Reducing On-Road CO_2 Emission

Existing GHG emissions are presented in Table 4-13, and future GHG emissions are presented in Tables 4-14 and 4-15. Emissions were estimated using EMFAC2011.

Table 4-13: Estimated Existing Daily Greenhouse Gas Emissions

Source	Carbon Dioxide Equivalent (Metric Tons per Day)
Existing Conditions (2009)	1,780

Source: Terry A. Hayes Associates Inc. 2014

Table 4-14: Estimated 2020 Daily Greenhouse Gas Emissions

Source	Carbon Dioxide Equivalent (Metric Tons per Day)
No Build Alternative	2,151
Alternative 1	1,519
Net Change from No Build to Alternative 1	(632)
Alternative 2	1,541
Net Change from No Build to Alternative 2	(610)
Alternative 3	1,538
Net Change from No Build to Alternative 3	(613)

Source: Terry A. Hayes Associates Inc. 2014

Table 4-15: Estimated 2040 Daily Greenhouse Gas Emissions

Source	Carbon Dioxide Equivalent (Metric Tons per Day)
No Build Alternative	3,509
Alternative 1	2,338
Net Change from No Build to Alternative 1	(1,171)
Alternative 2	1,806
Net Change from No Build to Alternative 2	(1,703)
Alternative 3	1,825
Net Change from No Build to Alternative 3	(1,684)

Source: Terry A. Hayes Associates Inc. 2014.

Operational Emissions

The proposed project is included in the Southern California Association of Governments (SCAG) 2012-2035 Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS) which includes a commitment to reduce emissions from transportation sources to comply with SB375. Many strategies and investment choices are outlined in this plan that when implemented as a whole are intended to meet the goals of GHG reduction as identified in SB375.

GHG emissions from the region, including the I-405 freeway, will continue in the future, and are currently expected to increase as the region becomes more populated. As such, the "business-as-usual[30]" approach will lead to an increase of GHG emissions and would be inconsistent with plans and policies aimed at reducing GHG emissions statewide.

All proposed build alternatives are expected to result in a reduction of greenhouse gases in the 2020 proposed build year when compared to both existing (2009) and future no-build (2020) conditions. While GHG emissions are expected to increase in the 2040 proposed build year as compared to the existing (2009) conditions, emissions are expected to decrease when comparing the 2040 proposed build conditions to the 2040 no-build conditions.

While GHG emissions are expected to increase regionally, the preferred alternative is expected to result in an overall reduction in GHG emissions and is most consistent with applicable GHG reduction policies and plans, including the SCAG 2012-2035 RTP/SCS.

Additionally, statewide GHG reduction goals or targets are not expected to be achieved using one project or sector. Instead, GHG reductions are expected to be achieved through a comprehensive approach, including non-transportation sector emitters, land use planning, and market-based incentives to reduce GHG emission.

Construction Emissions

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations. Construction GHG emissions include emissions produced as a result of material processing, emissions produced by onsite construction equipment, and emissions arising from traffic delays due to construction. These emissions would be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

In addition, with innovations, such as longer pavement lives, improved TMPs, and changes in materials, the GHG emissions produced during construction would be lessened to some degree by longer intervals between maintenance and rehabilitation events. Based on the construction emission assumptions in Section 3.2.6, Air Quality, construction activities would generate a total of approximately 6,226 metric tons (1,384 metric tons per year) of GHG emissions during the

[30] Business as Usual (BAU) – Business-as-Usual (BAU), as established by CARB, is a projected emissions inventory and does not represent actual business or operational practices generating GHG emissions. To establish BAU, ARB projected the Baseline Period emissions to the year 2020, using assumptions about potential growth, assuming no change in the existing business practices, and without considering implementation of any GHG emission reduction measures.

54-month construction period. As discussed in Section 3.2.6, Air Quality, measures AQ-1, AQ-5, AQ-6, AQ-9, and AQ-13 will help minimize construction-related GHG emissions.

Conclusion

While construction will result in GHG emissions, it is anticipated that the project will not result in an increase in operational GHG emissions when compared to the BAU approach. Based on the project resulting in less congestion and more efficient system operations, Caltrans anticipates that GHG emissions will decrease in the future build conditions when compared to the future no-build conditions. It is Caltrans' determination that, in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a determination regarding the significance of the project's direct impact and its contribution on the cumulative scale to global climate change. However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the project. These measurements are outlined in the following sections.

AB 32 Compliance

Caltrans continues to be actively involved on the Governor's Climate Action Team as CARB works to implement the Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies Caltrans is using to help meet the targets in AB 32 come from the California Strategic Growth Plan, which is updated each year. Former Governor Schwarzenegger's Strategic Growth Plan calls for a $222 billion infrastructure improvement program to fortify the state's transportation system, education, housing, and waterways, including $100.7 billion in transportation funding during the next decade. The Strategic Growth Plan targets a significant decrease in traffic congestion below today's level and a corresponding reduction in GHG emissions. The Strategic Growth Plan proposes to do this while accommodating growth in population and the economy. A suite of investment options has been created that, combined together, are anticipated to reduce congestion. The Strategic Growth Plan relies on a complete systems approach to attain CO_2 reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements, as depicted in Figure 4-3.

Figure 4-3: Mobility Pyramid

Caltrans is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high-density housing along transit corridors. Caltrans is working closely with local jurisdictions on planning activities; however, Caltrans does not have local land use planning authority. Caltrans also assists efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars and light- and heavy-duty trucks; Caltrans is doing this by supporting ongoing research efforts at universities, supporting legislative efforts to increase fuel economy, and participating on the Climate Action Team. It is important to note, however, that control of fuel economy standards is held by EPA and CARB.

Caltrans is also working towards enhancing the State's transportation planning process to respond to future challenges. Similar to requirements for regional transportation plans under SB 375 (Steinberg 2008), SB 391(Liu 2009) requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

The California Transportation Plan (CTP) is a statewide, long-range transportation plan to meet our future mobility needs and reduce GHG emissions. The CTP defines performance-based goals, policies, and strategies to achieve our collective vision for California's future, statewide, integrated, multimodal transportation system. The purpose of the CTP is to provide a common policy framework that will guide transportation investments and decisions by all levels of government, the private sector, and other transportation stakeholders. Through this policy framework, the CTP 2040 will identify the statewide transportation system needed to achieve maximum feasible GHG emission reductions while meeting the State's transportation needs.

Table 4-16 summarizes Caltrans and statewide efforts that Caltrans is implementing to reduce GHG emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (December 2006).

Caltrans Director's Policy 30 (DP-30) Climate Change (June 22, 2012) is intended to establish a Department policy that will ensure coordinated efforts to incorporate climate change into Departmental decisions and activities. Caltrans Activities to Address Climate Change (April 2013)[31] provides a comprehensive overview of activities undertaken by Caltrans statewide to reduce GHG emissions resulting from agency operations.

To the extent that it is applicable or feasible for the project and through coordination with the project development team, the following measures will also be included in the project to reduce the GHG emissions and potential climate change impacts from the proposed project:

[31] http://www.dot.ca.gov/hq/tpp/offices/orip/climate_change/projects_and_studies.shtml

Table 4-16: Climate Change/CO_2 Reduction Strategies

Strategy	Program	Partnership		Method/ Process	Estimated CO_2 Savings (MMT)	
		Lead	Agency		2010	2010
Smart Land Use	Intergovernmental Review (IGR)	Caltrans	Local Governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	Caltrans	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	Caltrans	Regional plans and application process	0.975	7.8
Operational Improvements & ITS Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	.007	2.17
Mainstream Energy & GHG into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, Cal/EPA, CARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 B100	0.0045	0.0065 0.45 .0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 .36	3.6
Goods Movement	Office of Goods Movement	Cal/EPA, CARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					2.66	18.67

Source: Caltrans 2011.

- Caltrans and the California Highway Patrol are working with regional agencies to implement ITS to help manage the efficiency of the existing highway system. ITS is commonly referred to as electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.
- In addition, SCAG provides ridesharing services and park-and-ride facilities to help manage the growth in demand for highway capacity.
    - The construction contractor must comply with SCAQMD rules, ordinances, and regulations in regards to air quality restrictions.

Adaptation Strategies

"Adaptation strategies" refer to how the Department and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damage to roadbeds from longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the federal level, the Climate Change Adaptation Task Force, co-chaired by the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA), released its interagency task force progress report on October 28, 2011[32], outlining the federal government's progress in expanding and strengthening the Nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provides an update on actions in key areas of federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as freshwater, and providing accessible climate information and tools to help decision-makers manage climate risks.

Climate change adaptation must also involve the natural environment as well. Efforts are underway on a statewide-level to develop strategies to cope with impacts to habitat and biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

[32] http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation

On November 14, 2008, then-Governor Arnold Schwarzenegger signed EO S-13-08 which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This EO set in motion several agencies and actions to address the concern of sea level rise.

In addition to addressing projected sea level rise, the California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state and federal public and private entities to develop The California Climate Adaptation Strategy (Dec 2009)[33], which summarizes the best-known science on climate change impacts to California, assesses California's vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to EO S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the California Environmental Protection Agency; Business, Transportation and Housing; Health and Human Services; and the Department of Agriculture. The document is broken down into strategies for different sectors that include: Public Health; Biodiversity and Habitat; Ocean and Coastal Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure. As data continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

The National Academy of Science was directed to prepare a Sea Level Rise Assessment Report[34] to recommend how California should plan for future sea level rise. The report was released in June 2012 and included:

- Relative sea level rise projections for California, Oregon, and Washington taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge and land subsidence rates.
- The range of uncertainty in selected sea level rise projections.

[33] http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF

[34] *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (2012) is available at: http://www.nap.edu/catalog.php?record_id=13389.

- A synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems.
- A discussion of future research needs regarding sea level rise.

In 2010, interim guidance was released by The Coastal Ocean Climate Action Team (CO-CAT) as well as Caltrans as a method to initiate action and discussion of potential risks to the states infrastructure due to projected sea level rise. Subsequently, CO-CAT updated the Sea Level Rise guidance to include information presented in the National Academies Study.

All state agencies that are planning to construct projects in areas vulnerable to future sea level rise are directed to consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should also be used in conjunction with information on local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge and storm wave data

All projects that have filed a Notice of Preparation (NOP) as of the date of the EO S-13-08, and/or are programmed for construction funding through 2013, or are routine maintenance projects may, but are not required to, consider these planning guidelines. The proposed project is outside the coastal zone and direct impacts to transportation facilities due to projected sea level rise are not expected.

Executive Order S-13-08 also directed the Business, Transportation, and Housing Agency to prepare a report to assess vulnerability of transportation systems to sea level rise affecting safety, maintenance and operational improvements of the system, and economy of the state. The Department continues to work on assessing the transportation system vulnerability to climate change, including the effect of sea level rise.

Currently, the Department is working to assess which transportation facilities are at greatest risk from climate change effects. However, without statewide planning scenarios for relative sea level rise and other climate change effects, the Department has not been able to determine what change, if any, may be made to its design standards for its transportation facilities. Once statewide planning scenarios become available, the Department will be able review its current design standards to determine what changes, if any, may be needed to protect the transportation system from sea level rise.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation

and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. The Department is an active participant in the efforts being conducted in response to EO S-13-08 and is mobilizing to be able to respond to the National Academy of Science Sea Level Rise Assessment Report.

4.2.8 Mitigation Measures for Potentially Significant Impacts and Less than Significant with Mitigation under CEQA

Avoidance, minimization, and mitigation measures are those discussed in Chapter 3 within each section under avoidance, minimization, and/or mitigation measures. Mitigation measures pursuant to CEQA were identified for each potentially significant effect of the project, described above in Section 4.2.3 and Section 4.2.5, and includes the following:

VIS-1: Beginning with preliminary design and continuing through final design and construction, plan, save, and protect as much existing vegetation in the corridor, especially eucalyptus and other skyline trees, as feasible.

VIS-2: Survey exact locations for existing trees and include in plans.

VIS-3: Protect with temporary fencing large infield areas of existing plantings to be preserved.

VIS-4: Transplant, relocated, protect, and maintain existing trees that are in conflict with the proposed improvements, replacement vegetation, and mesh fencing per Caltrans' District Landscape Architect approval.

VIS-5: Beginning with preliminary design and continuing through final design and construction, develop construction plans that apply architectural detailing to the proposed soundwalls, retaining walls, and bridges, including textures, colors, and patterns. Include elements such as caps, columns, pier caps, parapets, fencing, and abutment and wing walls as shown in the Aesthetics and Landscape Master Plan. In addition, bridge or architectural elements on ramps, bridges, and soundwalls will include forms and lines to match the existing built-environment features.

VIS-6: Beginning with preliminary design and continuing through final design and construction, landscape and revegetate disturbed areas to the greatest extent feasible.

VIS-7: Include skyline trees in the planting palette to bring down the scale of the new freeway elements.

VIS-8: Fund from this parent project and accomplish by separate contract a 3-year extended plant establishment project to assure a well-established highway planting. This separate contract must begin as soon as possible upon completion of the 1-year plant establishment period that may be accomplished with the roadway contract.

VIS-9: Design basins so that they appear to be a natural landscape feature, such as a dry streambed or a riparian pool. They shall be shaped in an informal, curvilinear manner.

VIS-10: Basin slope grading will incorporate slope rounding, variable gradients, and be similar to the surrounding topography to de-emphasize the edge. If a wall or hard feature is necessary, it shall be worked into the overall design concept.

VIS-11: Employ grading design of any ponds or swales, wherever possible, to be sympathetic to the Aesthetic and Landscape Master Plan.

VIS-12: Locate maintenance access drives in unobtrusive areas away from local streets. Such drives must consist of inert materials or herbaceous groundcover that is visually compatible with the surrounding landscape.

VIS-13: Design all basins so that chain-link perimeter fencing is not required.

VIS-14: Design all visible concrete structures and surfaces to adhere to the Aesthetic and Landscape Master Plan when developed.

VIS-15: Design rock slope protection to consist of aesthetically pleasing material with a variety of sizes.

VIS-16: Limit the use of bioswales within corridor landscape areas. If they must be used, locate them in nonobtrusive areas and design to appear as natural features.

VIS-17: Caltrans has existing ongoing maintenance programs for the control and removal of graffiti, which would apply to all new and modified structures on public and private property, as appropriate. Key components of those programs are:

- Chapter D1, Litter, Debris, and Graffiti (July 2006), in the Caltrans Maintenance Manual (Volume I, January 2011) describes the Caltrans maintenance program for the control and removal of graffiti. Key program components applicable to the project features are:
  - Use of recycled paint for various structures and matching paint used to cover graffiti with the original paint color on the structure.

- Use of physical devices, such as rat guards, sign hoods, razor wire, and glare screen patches, to limit access to facilities targeted by taggers.
- Replacement of ground-mounted signs with signs that have protective coatings or application of protective coatings to signs.

VIS-18: Provide vine planting on soundwalls and retaining walls where feasible and appropriate. Per Highway Design Manual, Index 902.3(5), vine planting should be included with all sound barrier projects to reduce the potential for graffiti and to soften the appearance of the wall.

VIS-19: Protect with temporary fencing the drip line of existing isolated trees identified on plans as to remain.

VIS-20: Plant biostrips and bioswales with vegetative cover that includes a combination of low-growing shrubs and groundcover per the NPDES Construction General Permit, A.9 Definitions: 1) Vegetative Cover.

VIS-21: Glare shields shall be used wherever possible to reduce lighting impacts, and to redirect light onto the facility and away from adjacent homes and areas of wildlife habitat.

PAL-1: If auguring or foundation construction will penetrate 5 ft or more into undisturbed sediment, Caltrans shall ensure that a PMP is prepared and adhered to during construction of the portions that are identified as having high paleontological sensitivity. The PMP shall include, but not be limited to, the following instructions:

- A qualified principal paleontologist (MS or PhD in paleontology or geology familiar with paleontological procedures and techniques) will be retained to prepare a Paleontological Mitigation Plan (PMP) following the Caltrans Standard Environmental Reference (SER) if auguring or foundation construction will penetrate 5 ft or more into undisturbed sediment.
- The paleontologist will be present to consult with construction contractors at pre-grading meetings.
- Paleontological monitoring under the direction of the qualified principal paleontologist will be performed for subsurface construction activities involving sensitive geologic formations.
- When fossils are discovered, the paleontologist (or paleontological monitor) will recover them. Construction work in these areas will be halted or diverted to allow recovery of fossil remains in a timely manner.

- Fossil remains collected during the monitoring and salvage portion of the mitigation program will be prepared and cataloged.
- Prepared fossils, along with copies of all pertinent field notes, photos, and maps will then be deposited in a scientific institution with paleontological collections.
- A final report will be completed that outlines the results of the mitigation program.

CUL-4: Navy requirement that a qualified Native American and qualified Archaeologist monitor earthmoving activities associated with project construction in the vicinity of the NAVWPNSTA Seal Beach, located along the south of I-405 within the project limits. The areas along the southern I-405 and the northern boundary of the NAVWPNSTA property that require monitoring, will be designated as an Archaeological Monitoring Area (AMA) on the final plans and included in the specifications and estimates for the project. The Native American and Archaeologist will prepare daily monitoring logs and a final report summarizing findings will be submitted to both Caltrans and the Navy following construction completion.

GEO-1: In accordance with standard Caltrans requirements, detailed geotechnical studies shall be conducted during the project's future PS&E phase. If results of these studies find high potential for seismic slope instability or lateral spreading, additional measures will need to be incorporated for new structures associated with the project, including bridges, embankments, and retaining walls. Resulting recommendations from the detailed studies shall be incorporated into the project's final design plans to address seismic safety, liquefaction, and load-bearing concerns present in the project area.

GEO-2: Selection of earth-retaining system types should be based on consideration of foundation bearing capacity, anticipated settlement and ability of the system to tolerate settlements, overall slope stability, constructability, and cost.

GEO-3: Depending on locations, drilled piles (for sign foundations or soundwalls) may extend below the groundwater and will require appropriate construction methods.

GEO-4: Corrosion mitigation for steel and concrete structures should generally follow Caltrans Corrosion Guidelines (2003 or latest). The latest Caltrans Highway Design Manual (Section 855) provides corrosion requirements for roadway structures (e.g., culverts, signs) for a 50-year design life (Caltrans, 2010).

GEO-5: The project engineer shall request a Materials Report in the early stage of PS&E. The report shall include the results of field tests and sampling for corrosion (i.e., pH, sulfate, chloride, and minimum resistivity) for use in recommending culvert materials

and concrete mix designs. Sampling and testing shall be performed in accordance with Caltrans Corrosion Guidelines (2003 or latest).

GEO-6: In general, earthwork should be performed in accordance with Sections 6 and 19 of the Caltrans Standard Specifications. The new construction will have to be carefully planned to protect the many existing utilities in the area.

GEO-7: Monitoring during construction shall be done by a licensed geologist and engineer to ensure that the construction site was properly characterized by the geotechnical studies and that the project design is in compliance with geotechnical and seismic safety standards and practices included in the final design package.

HAZ-1: Prior to completion of the Final Design, sampling for ADL shall be conducted by OCTA within unpaved locations adjacent to the existing roadway ROW within the study area if such locations have not been tested.

HAZ-2: Prior to construction, if still present, two 30-gallon open trash bins and two 5 gallon buckets that were dumped in the I-405 northbound shoulder just south of the I-605 interchange shall be removed and properly disposed of by the contractor.

HAZ-3: During the construction phase, the upper 2 ft of soil excavated along the I-405 northbound shoulder from the I-605/I-405 connector to approximately 1,000 ft south of the I-605/I-405 connector shall be set aside and tested for TPH (gasoline and diesel) by the contractor before being disposed of or reused at the site.

HAZ-4: If signs of potential impacts (e.g., odors, discolored soil, and any hazardous waste) are observed during construction activity, construction shall cease and the California Department of Transportation's Unknown Procedures for Construction shall be followed. If groundwater is encountered during construction activities, or if construction dewatering is necessary, then sampling and analysis of groundwater shall be conducted to identify the appropriate management and disposal of the groundwater.

COM-1: No two consecutive/adjacent off-ramps or two consecutive/adjacent on-ramps in the same direction will be closed concurrently.

COM-2: Business access will be maintained at all times during construction, consistent with Section 7-1.03 Public Convenience of Standard Specifications (2010.

COM-3: Ramps that provide access immediately adjacent to South Coast Plaza (South Coast Drive northbound off-ramp), Bella Terra Mall (Beach Boulevard off-ramps), or Westminster Mall (Bolsa Avenue northbound and Goldenwest Street southbound off-ramps) will not be closed from November 1 to January 31.

COM-4: Provision of motorist information (i.e., existing changeable message signs, portable changeable message signs, stationary ground-mounted signs, traffic radio announcements, and the Caltrans Highway Information Network [CHIN]).

COM-5: Incorporation of traffic circulation construction strategies (i.e., lane closure restrictions during holidays and special local events, closure of secondary streets during construction to allow quick construction and reopening, lane modifications [lane reductions, shifts] to maintain the number of lanes needed, allowing night work and extended weekend work, maintaining business access, and maintaining pedestrian and bicycle access). In addition, see Traffic Measure T-1 for public information regarding the TMP. Upon completion, the final TMP can be obtained by request from OCTA.

COM-6: Implementation of alternate and detour routes strategies; street/intersection improvements (e.g., widening, pavement rehabilitation, removal of median, restriping) to provide added capacity to handle detour traffic; signal improvements; adjustment of signal timing and/or signal coordination to increase vehicle throughput, improve traffic flow and optimize intersection capacity; turn restrictions at intersections and roadways necessary to reduce congestion and improve safety; and parking restrictions on alternate and detour routes during work hours to increase capacity, reduce traffic conflicts, and improve access.

COM-7: Coordination with the relevant parks and recreation departments of affected parks shall occur during construction to ensure the access and safety of users in the parks and trails adjacent to the proposed project.

COM-8: Close coordination with utility service providers and the implementation of a public outreach program will be conducted to minimize impacts to surrounding communities.

COM-9: Close coordination with railroad owners and operators will be conducted during final design and construction phases to minimize impacts to railroad operations.

COM-10: During design and construction, OCTA shall work closely with affected property owners to identify means to avoid and minimize parking impacts, including space

management such as restriping of parking areas and identifying parking replacement options. When required, property owners shall receive compensation for the partial loss of property through the ROW acquisition process.

COM-11: Maintain good public relations with the community to minimize objections to the unavoidable construction impacts. OCTA will implement a community information plan to maintain good community relations with the public by providing timely information about anticipated construction activities to affected citizens and adjacent property owners. Notification methods could include, but are not limited to, website, fliers, mailers, e-mail blasts, and electronic messaging on the freeway.

COM-12: The existing Heil Avenue pedestrian crossing will remain open for use until the replacement crossing has been completed.

UT-2: During construction, emergency service providers will be alerted in advance of any temporary road closures and delays so that they have adequate time to make appropriate accommodations to ensure prompt emergency response times that fulfill their responsibilities and defined service objectives.

T-1: A Final TMP will be prepared prior to project construction that identifies methods to avoid and minimize construction-related traffic and circulation effects and minimize impacts to pedestrian and bicycle access, including ADA-compliant features as a result of the proposed project. During construction, the contractor shall implement the methods identified in the Final TMP.

T-2: During final design, plans shall be prepared to incorporate the following improvements at the Slater Avenue/Brookhurst Street intersection, which the contractor shall implement during construction:

- Convert the southbound right-turn lane on Brookhurst Street to a fourth through lane (with right turns shared).
- Convert the existing second eastbound through lane on Slater Avenue at Brookhurst Street to a shared through/right-turn lane. Retain the existing eastbound exclusive right-turn lane.
- Provide increased queue storage areas for northbound right-turn, northbound left-turn, eastbound right-turn, and westbound left-turn movements.

T-3: During final design, plans shall be prepared to incorporate the following improvements at the Talbert Avenue/Brookhurst Street intersection, which the contractor shall implement during construction:

- Add a third westbound through lane on Talbert Avenue. Retain the existing westbound exclusive right-turn lane.
- Convert the southbound right-turn lane on Brookhurst Street to a fourth through lane (with right turns shared).
- Convert the eastbound right-turn lane on Talbert Avenue to a fourth through lane (with right turns shared).
- Convert the existing third northbound through lane on Brookhurst Street to a shared through/right-turn lane. Retain the existing northbound exclusive right-turn lane.

T-4: During final design, plans shall be prepared to incorporate the following improvements at the Warner Avenue/Magnolia Street intersection, which the contractor shall implement during construction:

- Convert the southbound right-turn lane on Magnolia Street at Warner Avenue to a shared through/right-turn lane. Extend the third southbound through lane on Magnolia Street south of the intersection.
- Provide dual northbound left-turn lanes on Magnolia Street at Warner Avenue.
- Extend the southbound dual left-turn pocket from the existing 200 ft to approximately 440 ft of queue storage.

T-5: During final design, plans shall be prepared to incorporate the following improvements at the McFadden Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

- Provide an exclusive northbound right-turn lane on Beach Boulevard.
- Provide increased queue storage areas for eastbound right-turn and westbound left-turn movements.

T-6: During final design, plans shall be prepared to incorporate the following improvements at the Center Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

- Provide an exclusive right-turn lane and a shared through/right-turn lane on southbound Beach Boulevard.

- Add a third eastbound right-turn lane on Center Avenue at Beach Boulevard. Increase the eastbound Center Avenue left-turn queue storage to 270 ft per lane and right-turn queue storage to 450 ft per lane.
- Provide a fifth northbound through lane on Beach Boulevard.

T-7: During final design, plans shall be prepared to incorporate the following improvements at the Edinger Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

- Add a fourth northbound through lane on Beach Boulevard at Edinger Avenue.
- Convert the existing eastbound right-turn only lane on Edinger Avenue at Beach Boulevard to a fourth through lane (with a shared right turn) and extend the lane to Parkside Lane to increase vehicle queue storage. Sign and stripe to allow two curb lanes on eastbound Edinger Avenue at Beach Boulevard as freeway access lanes (to the southbound on-ramp at Edinger Avenue).
- Extend the existing southbound dual left-turn lanes on Beach Boulevard from the existing queue storage of 240 ft to an average of 300 ft per lane.
- Widen the Edinger Avenue overcrossing to provide two westbound through lanes and two eastbound through lanes. The third eastbound through lane on Edinger Avenue from Beach Boulevard is dropped at the bridge overcrossing.
- At the intersection of eastbound Edinger Avenue and the I-405 southbound on-ramp, provide an exclusive right-turn and a shared through/right-turn lane on eastbound Edinger Avenue, thereby allowing two lanes onto the southbound ramp.
- Provide increased queue storage areas for southbound left-turn, eastbound left-turn, and westbound left-turn movements.

T-8: During final design, plans shall be prepared to incorporate the following improvements at the Bolsa Avenue/Goldenwest Street intersection, which the contractor shall implement during construction:

- Widen the southbound approach on Goldenwest Street to provide an exclusive right-turn lane and a second left-turn lane. The southbound left-turn pocket is extended past the Goldenwest Street/Westminster Mall Road intersection.
- Widen the northbound approach on Goldenwest Street at Bolsa Avenue to provide an exclusive right-turn lane with queue storage of approximately 430 ft.
- Convert the eastbound right-turn lane on Bolsa Avenue to a fourth through lane (with right turns shared). Widen the south side of Bolsa Avenue between

Goldenwest Street and the I-405 southbound on-ramp. Sign and stripe to allow two curb lanes on eastbound Bolsa Avenue at Goldenwest Street as freeway access lanes (to the I-405 southbound on-ramp from Bolsa Avenue).

- Widen the westbound approach to provide extended queue storage of 750 ft for the right-turn lane and increased queue storage of 280 ft for the left-turn lanes.

T-9: During final design, plans shall be prepared to incorporate the following improvements at the Garden Grove Boulevard and Bolsa Chica Road/Valley View Street intersection, which the contractor shall implement during construction:

- Add a third westbound right-turn lane on Garden Grove Boulevard.
- Add a third through lane on northbound Bolsa Chica Road/Valley View Street.
- Extend the northbound right-turn lane on Bolsa Chica Road/Valley View Street and increase the existing queue storage of 400 ft to approximately 800 ft.

T-10: A payment shall be made by OCTA (Phase 1) and Caltrans (Phase 2) to the City of Long Beach based on a Cooperative Agreement to be negotiated and executed between OCTA/Caltrans and the City of Long Beach. The Cooperative Agreement shall identify the project's fair share of the costs for the improvements at intersections owned by the City of Long Beach based on the PA and in accordance with the fair share percentages for each location identified below. The Cooperative Agreement shall provide:

- That the City of Long Beach's Transportation Mitigation Program will be revised to include the locations listed below under A, B, or C for the PA;
- That the payment made by OCTA shall be placed into the City of Long Beach Transportation Mitigation Program and shall only be used to provide improvements to remedy impacts of the PA at the intersections listed below under A, B, or C for the PA;
- The amount of the total payment to be applied to each location; and
- That the proposed improvements shall be implemented by the City of Long Beach, with the City of Long Beach bearing responsibility for necessary clearances and permits.

- If the implementing agency of this measure decides not to move forward with these improvements, these cumulative impacts would remain adverse.

A. If PA is Alternative 1:

- Los Coyotes Diagonal and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach.
  - Fair Share Percentage: 4.45%. (estimated total construction cost in 2013 dollars is $250,000)

B. If PA is Alternative 2:

- Willow Street and Bellflower Boulevard intersection:
  - Add an exclusive right-turn lane to eastbound approach;
  - Add a second left-turn lane to westbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 10.41%. (estimated total construction cost in 2013 dollars is $810,000)
- Willow Street and Los Coyotes Diagonal intersection:
  - Add a second left-turn lane to eastbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 31.57%. (estimated total construction cost in 2013 dollars is $440,000)
- Willow Street and Woodruff Avenue intersection:
  - Add a second left-turn lane to northbound approach.
  - Fair Share Percentage: 10.40%. (estimated total construction cost in 2013 dollars is $240,000)

C. If PA is Alternative 3:

- Willow Street and Bellflower Boulevard intersection:
  - Add an exclusive right-turn lane to eastbound approach;
  - Add a second left-turn lane to westbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 10.41%. (estimated total construction cost in 2013 dollars is $810,000)
- Los Coyotes Diagonal and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach.
  - Fair Share Percentage: 8.32%. (estimated total construction cost in 2013 dollars is $250,000)
- Willow Street and Los Coyotes Diagonal intersection:

  - Add a second left-turn lane to eastbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 30.03%. (estimated total construction cost in 2013 dollars is $440,000)

T-11: A payment shall be made by OCTA to Caltrans based on a Traffic Mitigation Agreement Fair Share Deferment to be negotiated and executed between OCTA and Caltrans. The Traffic Mitigation Agreement Fair Share Deferment shall identify the project's fair share of the costs for the improvements at intersections owned by the State of California based on the PA and in accordance with the fair share percentages for each location identified below. The Traffic Mitigation Agreement Fair Share Deferment shall provide:

- That Caltrans will establish separate accounts for each of the locations listed below under A, B, or C for the PA;
- That the payment made by OCTA shall be held by Caltrans and shall only be used to provide improvements to remedy impacts of the PA at the intersections listed below under A, B, or C for the PA;
- The amount of the total payment to be applied to each location;
- That the amounts for different locations shall not be commingled; and
- That the proposed improvements shall be implemented by Caltrans, with Caltrans bearing responsibility for necessary clearances and permits.
- If the implementing agency of this measure decides not to move forward with these improvements, these cumulative impacts would remain adverse.

It should be noted that the State of California would implement a project only when enough funds have been collectively received for that specific mitigation measure.

A. If PA is Alternative 1:
   - SR-22 westbound on-/off-ramp and College Park Drive intersection:
     - Add a second northbound through lane to the off-ramp approach to College Park Drive starting approximately 300 feet (ft) south of their intersection; and
     - Replace existing traffic control with a traffic signal.
     - Fair Share Percentage: 12.11%. (estimated total construction cost in 2013 dollars is $1,570,000)
   - 7th Street and Pacific Coast Highway intersection:

- Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.
- Fair Share Percentage: 11.70%.(estimated total construction cost in 2013 dollars is $450,000)

- 7th Street and West Campus Drive intersection:
  - Add an exclusive right-turn lane to westbound approach, modifying traffic signals as needed.
  - Fair Share Percentage: 9.16%. (estimated total construction cost in 2013 dollars is $300,000)
- 7th Street and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
  - Fair Share Percentage: 11.70%. (estimated total construction cost in 2013 dollars is $640,000)

B. If PA is Alternative 2:

- SR-22 westbound on-/off-ramp and College Park Drive intersection:
  - Add a second northbound through lane to the off-ramp approach to College Park Drive starting approximately 300 ft south of their intersection; and
  - Replace existing traffic control with a traffic signal.
  - Fair Share Percentage: 33.25%. (estimated total construction cost in 2013 dollars is $1,570,000)
- 7th Street and Pacific Coast Highway intersection:
  - Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.
  - Fair Share Percentage: 7.84%. (estimated total construction cost in 2013 dollars is $450,000)
- 7th Street and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
  - Fair Share Percentage: 16.92%. (estimated total construction cost in 2013 dollars is $640,000)
- 7th Street and Channel Drive intersection:

- Add a second left-turn lane to westbound approach, modifying signals as necessary; and
- Provide dual southbound exclusive left-turn lanes.
- Fair Share Percentage: 13.59%. (estimated total construction cost in 2013 dollars is $240,000)

- 7th Street and West Campus Drive intersection:
  - Add an exclusive right-turn lane to westbound approach, modifying traffic signals as necessary.
  - Fair Share Percentage: 27.34%. (estimated total construction cost in 2013 dollars is $300,000)
- 7th Street and East Campus Drive intersection:
  - Add a right-turn lane to westbound approach, modifying traffic signals as necessary and maximizing eastbound and westbound left-turn pocket lengths.
  - Fair Share Percentage: 21.30%. (estimated total construction cost in 2013 dollars is $450,000)

C. If PA is Alternative 3:

- 7th Street and Pacific Coast Highway intersection:
  - Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.
  - Fair Share Percentage: 8.08%. (estimated total construction cost in 2013 dollars is $450,000)
- 7th Street and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
  - Fair Share Percentage: 17.64%. (estimated total construction cost in 2013 dollars is $640,000)
- 7th Street and Channel Drive intersection:
  - Add a second left-turn lane to westbound approach, modifying signals as necessary; and
  - Provide dual southbound exclusive left-turn lanes.
  - Fair Share Percentage: 14.01%. (estimated total construction cost in 2013 dollars is $240,000)
- 7th Street and West Campus Drive intersection:

- Add an exclusive right-turn lane to westbound approach, modifying traffic signals as necessary.
- Fair Share Percentage: 25.02%. (estimated total construction cost in 2013 dollars is $300,000)

- 7th Street and East Campus Drive intersection:
  - Add a right-turn lane to westbound approach, modifying traffic signals as necessary and maximizing eastbound and westbound left-turn pocket lengths.
  - Fair Share Percentage: 7.39%. (estimated total construction cost in 2013 dollars is $450,000)

T-12 To address the potential operational challenge on the express lanes (under the HOV2+ free policy), a process will be developed to address the issue by considering HOV occupancy policy which may include, but not limited to:

- adjusting to HOV3+ free with HOV2s discounted tolls
- adjusting to HOV3+ free with HOV2s full tolls
- adjusting to tolling HOV2s on individual tolling segments such as direct connectors to or from other freeways
- periodic adjustments of tolling rates to maintain operations on individual tolling segments